CHARACTERIZATION OF WATERSHEDS ON FORT BENNING MILITARY RESERVATION: COMPARISON OF FIELD DATA TO WATERSHED PARAMETERS

Melinda Rosetta Stahl

Columbus State University

The College of Science

The Graduate Program in Environmental Science

Characterization of Watersheds on Fort Benning Military Reservation: Comparison of Field Data to Watershed Parameters

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Melinda Rosetta Stahl

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Melinda Rosetta Stahl

We approve the thesis of Melinda Rosetta Stahl as presented here.

1/7/2011
Date

Roger Brown, Associate Professor of Geology, Thesis Advisor

Date

William Frazier, Director and Professor of Environmental Science

1/7/2011
Date

Troy Keller, Assistant Professor of Environmental Science

ABSTRACT

Sixteen watersheds located on Fort Benning Military Installation in Georgia were analyzed using both physically collected data and computer modeling data. Physical data collected included total suspended solids (TSS) and grain size analysis using the Wolman Pebble Count method. Computer modeling analyzed the watersheds using ArcGIS 9.3 for comparison to physical data. Land use, slope, and soil data were used in a modified revised universal soil loss equation (RUSLE) to create a soil erodibility index map. Wolman Pebble Count data showed that in half of the watersheds, 84% of the sampled grains were less than half a millimeter in size. Watersheds studied were dominated by Nankin sandy clay loam soils, Troup loamy sand soils and Cowarts & Ailey soils types. Results showed that baseflow TSS was greatest in disturbed and urbanized catchments. The soil erodibility index maps produced in ArcGIS using the modified RUSLE equation indicate areas with the potential for high erosion rates. Watersheds that had the highest potential for erosion contained less than 55% forest coverage.

Correlation analysis indicated relationships between the D10 and D50 grain size and the slopes of the watersheds. Relationships were also established between TSS, soil loss erodibility index, and land use classification factor. The results suggest that the GIS/RUSLE model could be used for estimating soil loss; however, other factors like unique land disturbance need to be included to improve its accuracy.

Additionally, a land use classification image would be sufficient in determining areas with potential water quality issues within a watershed. However, this method would not provide a physical measurement of soil loss within the watershed. Creating an additional index for proposed military land use in each of the watersheds would refine the GIS modeling and provide a better output for the identification of best management practices to improve water quality.

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AKNOWLEDGMENTS

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INTRODUCTION

High sediment yields have been established as a critical indicator of stream health (Sutherland *et al.*, 2002; *Roy et al.*, 2003; Walters *et al.*, 2003). Just as humans measure their own health (high blood pressure, high cholesterol, diabetes and so on), river systems can be rated in terms of health based on their use, function, and condition (Karr, 1999). The health of a stream is based on several different criteria, including chemical, physical and biological components, which reflect the condition of the stream (Karr, 1999; USEPA, 2010a). A stream and its related condition can then compared with other streams in the same region that have the same designated use (drinking water, fishing, recreation, wild or scenic-river, and coastal fishing) to determine if the stream is supporting or not supporting its designated use (GA EPD, 2010).

Sediment as mentioned above is a critical factor when measuring the health of a stream. It is a common non-point source of water pollution as it enters into the streams and rivers as runoff from a variety of sources, including agricultural areas, silviculture activities, urban and roadway storm drains, construction activities, and from irrigation. Not surprising, the United States Environmental Protection Agency (2002) lists sediment as one of the top ten causes for stream impairment. Non-point pollution has been a growing problem and concern for the quality of the nation's waters. The Clean Water Act (CWA - formerly the Federal Water Pollution Control Act, 1948) was created to protect and restore the waters

in the United States. The CWA requires that all States evaluate streams for water quality and assess them for non-point source pollution (CWA, sec. 319, 33 U.S.C. 1251 et seq.).

Geography, size, location and accessibility are a few challenges associated with evaluating streams for compliance. To approach these challenges watershed studies have been implemented to assess water quality. Watersheds exhibit characteristics that influence the quality of the water flowing within them (USEPA, 2010b). Any indicators of impairment can be traced within the watershed and analyzed in more detail. Once a watershed has been analyzed, a monitoring program can be implemented to reduce, monitor and correct any identified problems.

Biological assessments are valuable tools for determining water quality and stream health. There are several biological assessment methods that can be used (Barbour *et al.*, 1999). Diatoms (Sevenson and Pan, 1999; Wang *et al., 2005*) and benthic invertebrates (Karr, 1981; Barbour *et al.,* 1999; Hughes *et al., 2010)* living in the streams have been used to establish criteria for determining stream health and water quality.

The Rapid Bio-assessment Protocol (RBP) was developed as a method to identify the existence, severity, and sources of impairment, and as a tool to evaluate the effectiveness of restoration activities (USEPA, 1991). The RBP uses a collection of data that includes chemical, physical and biological (macro-

invertebrate) aspects that are representative of the stream under evaluation. The data are then evaluated and ranked with a matrix system developed for the eco-region in which the stream is located (GA DNR, 2007).

Physical measurements of stream flow, channel dimensions and sediment characteristics within watersheds provide valuable insight to the watersheds' characteristics. Wolman pebble counts (1954) are a quick and simple method used to characterize the composition of streambeds (Bevenger and King, 1995). They are effective for monitoring watersheds because they provide a quick method for evidence of fine sediments that may be introduced by land disturbance or management activities (Potyondy and Hardy, 2007). Total suspended solids (TSS) measure the particles that have been washed out of the watershed into the stream and have been related with the percentage of exposed soils within the watershed (Houser *et al.*, 2006; Imm *et al.,* 2009). Sediments and total suspended solids can both degrade water quality and are listed as two of the top ten causes for stream impairment in the United States (USEPA, 2007).

Additional methods incorporate the use of computer modeling to assess water quality. Data for most areas are readily accessible on the internet from several sources such as the US Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), US Environmental Protection Agency (US EPA), and the Natural Resources Conservation Service (NRCS). Additionally, there are several free geographical information systems (GIS) programs that can analyze the data, such as BASINS (Better Assessment Science Integrating point

and Non-Point Sources program developed by the United States Environmental Protection Agency and available at http://www.epa.gov/waterscience/basins) and GRASS (Geographic Resource Analysis Support System, developed by the United States Army Construction Engineering Research Laboratories and available at http://grass.osgeo.org/download/index.php).

Modeling programs have several benefits when used to evaluate watersheds; however, field data are often necessary to calibrate the programs to verify their accuracy. Finding a simple, quick, yet inexpensive method of evaluating watersheds would be beneficial for large management areas where access can be limited.

Several water quality parameters can determine stream health. Total suspended solids (TSS) and bed sediment grain-size are two that give valuable insight into the erosion and transportation of sediments from the uplands. These insights, used along with GIS data, could prove to be beneficial in evaluating the stream quality within watersheds.

Soil Erosion research began in the United States in 1912 with a study of overgrazed rangeland in Utah. The "Dust Bowl" in the 1930s provided congressional support to increase research on soil erosion. Results from all of this research provided information on runoff and soil loss by location, slope, soil and management conditions (Flanagan *et al.*, 2003). Ultimately a mathematical equation was developed that estimated soil loss based on different factors that

influenced soil erosion. The Universal Soil Loss Equation (USLE) was introduced in 1961 by Wischmeier and Smith with the publication of ARS Special Report 22-66 as cited on United States Department of Agriculture USLE History web page (http://www.ars.usda.gov/Research/docs.htm?docid=18093). USLE was updated in 1978 with the publication of Agriculture Handbook Number 537 (Wischmeier and Smith, 1978). More recently Renard *et al.* (1997) revised the equation (RUSLE) to incorporate technological advances and refinement of input parameters. USLE contains six factors that yield an estimate of soil loss per unit area. The soil loss equation and factors are shown in Equation 1.

$$A = R\,K\,L\,S\,C\,P$$

where:

A = Annual Soil Loss (ton/acre year)
R = Rainfall and Runoff Factor (hundreds of foot·ton force·inch / acre·hour·year)
K = Soil Erodibility Factor (ton·acre·hour / hundreds of foot·ton force·inch)
LS = Length (feet) and Slope (percent) Factors (dimensionless)
C = Cover and Management Factor (dimensionless)
P = Support Practice Factor (dimensionless)

Equation 1 - Universal Soil Loss Equation (Renard *et al.*, 1997)

Improvements from the USLE equation to the RUSLE equation variables include: increased precision for R values in the Western United States as well as some changes to the Eastern United States values to account for the splash erosion associated with flat slopes; adjusted K factors to account for soil moisture, freezing and thawing; new equations for calculating LS that take into

consideration complex slopes; increased intervals for C factors to include soil changes that occur throughout the year; and adjustments to the P factor –based on hydrologic soil groups, slope, row grade, ridge height, and the 10-year single storm erosion index value (Renard *et al.,* 1991; Renard *et al.,* 1994).

Inaccurate estimates of soil loss often occur from the length factor of the equation. Slope length is defined as the horizontal distance from the origin of overland flow to the point where either (1) the slope gradient decreases enough that deposition begins or (2) runoff becomes concentrated in a defined channel (Wischmeier and Smith, 1978). Lengths are often misrepresented when derived from maps, because the maps often lack enough detail to show areas of deposition or areas of concentrated flow (Renard *et al.*, 1997). Studies have also examined data used to determine the accuracy of the R factor for the area (Yu *et al.*, 1996; Yu *et al.*, 1999; Diodato, 2004). However, even with problems involved in using RUSLE to determine soil loss, it remains one of the most widely used methods for obtaining erosion estimates (Gitas *et al.,* 2009).

PURPOSE OF STUDY

The purpose of this study is to determine if a relationship exists between the physical measurements of total suspended solids (TSS) and Wolman Pebble Count data and a GIS-derived soil erodibility index based on a modified equation of RUSLE. Integration of these data can then be used to evaluate the potential effects of watershed water quality, and the vulnerability of specific watersheds to continuing land-use impacts from military activities. A beneficial output from this study is the set of maps that were generated for each watershed. These maps illustrate potential areas of high erosion rates (soil erodibility index maps) and the factors (soil, slope, and land-use) used to determine the areas of erosion.

STUDY AREA

Fort Benning

The study area used for this project was Fort Benning Military Installation. Fort Benning Military Installation is located south of Columbus, Georgia and is part of the HUC03130003, Middle Chattahoochee-Walter F. George Reservoir Watershed, Figure 1. The Installation encompasses approximately 182,500 acres (78,355 hectares) and is located mostly within the Southeastern Plains eco-region (Griffith, 2000). The soils are all highly erodible and are derived primarily from coastal plain sands and clays deposited during the Cretaceous Period (Reinhardt, 1986).

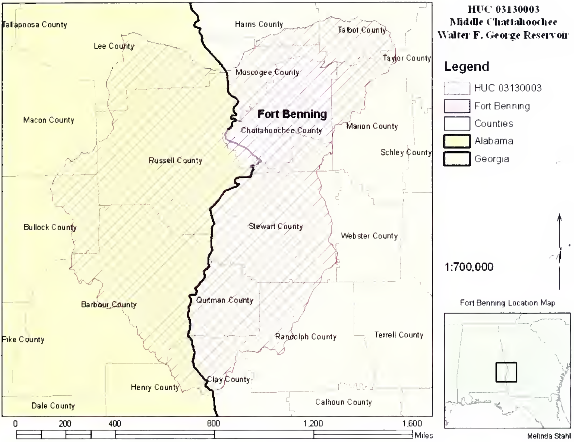


Figure 1 – Location of Fort Benning within the HUC 03130003 watershed.

Fort Benning has recently developed a Watershed Protection Master Plan for the twenty-nine watershed management units (WMU) located within its boundaries. The purpose of this Master Plan is to design individual watershed management plans for each of the WMUs. These plans will estimate sediment loads, identify management practices needed to maintain or reduce loads and create site-specific monitoring for maintaining goals (USACHPPM, 2008). To assess the stream health on Fort Benning, rapid biological protocol (RBP) on macro-

invertebrates was conducted on 34 streams in 22 WMUs during the Fall 2008 - Spring 2009 seasons.

Portions of the data collected from the RBP assessment have been used in this project for comparisons. The RBP sites were evaluated for use with this study and sites were eliminated if data was incomplete (field data or GIS) for the watershed. Sixteen watersheds were retained (Figure 2) after evaluating each of the 34 original sites for the criteria necessary to complete this study. Watersheds were omitted if more than 50% of the watershed was outside Fort Benning's boundary.

Four watersheds are located in Muscogee County: Tiger, Wolf, Long Branch, and an unnamed tributary to Upatoi Creek Watersheds (Figure 3). The remaining 12 watersheds are located in Chattahoochee County: Shell, Sand Branch, Orphan, Oswichee, and Hewell Branch Watersheds (Figure 4) and Bonham, Sally Branch, Little Pine Knot, Halloca, Hewell Branch, Hollis Branch, Hollis, and an unnamed tributary to Ochillee Creek Watersheds (Figure 5). Maps of the watersheds analyzed are located in Appendix A.

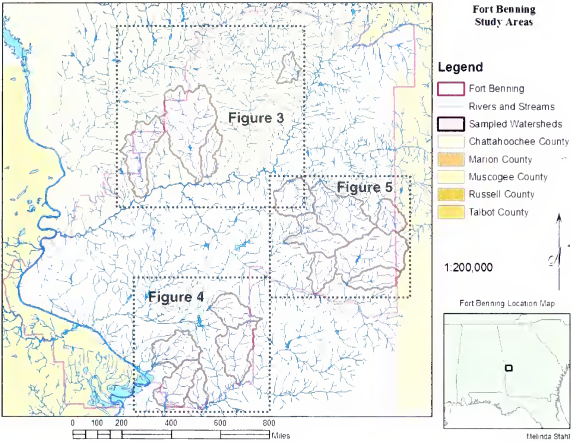


Figure 2 - Overall map of Fort Benning showing the location of the 16 studied watersheds. Insets (Figures 3, 4, 5) follow at a smaller scale showing more detail as well as the location of specific watersheds.

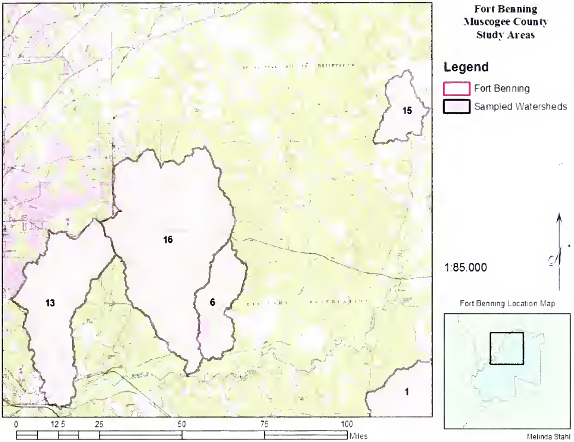


Figure 3 - Map of the Muscogee County study areas. #13 – Tiger Creek Watershed, #16 – Wolf Creek Watershed, #6 – Long Branch Watershed, #15 – Unnamed Tributary to Upatoi Creek Watershed. #1 – Bonham Creek Watershed, is located in Chattahoochee County and is included with Figure 5.

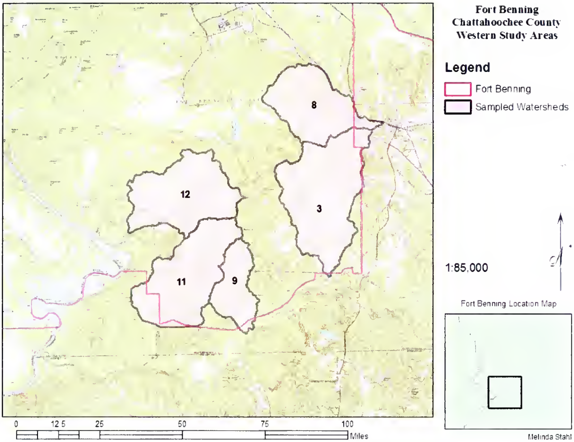


Figure 4 – Map of the Chattahoochee County western study areas. #8 – Oswichee Creek Watershed, #12 – Shell Creek Watershed, #11 – Sand Branch Watershed, #9 – Orphan Creek Watershed, and #3 – Hewell Creek Watershed.

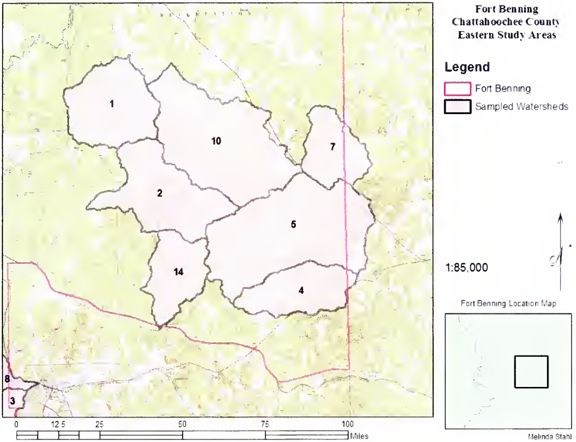


Figure 5 - Map of the Chattahoochee County eastern study areas. #1 – Bonham Creek Watershed, #10 – Sally Branch Watershed, #2 – Little Pine Knot Watershed, #2 – Halloca Creek Watershed, #14 – Unnamed Tributary to Ochillee Creek Watershed, #5 Hollis Creek Watershed, and #4 – Hollis Branch Watershed

Land use

Current land use for the study areas includes residential/cantonment to agricultural, forest, and military ground-training with heavy maneuver areas. However, much of the area has a history of agricultural use with poor farming practices from the 1800s (Kane and Keeton, 2003). The lack of best management practices has left many of the streams deeply incised and laden with sediment (Imm *et al.,* 2009). Part 303(b) of the CWA requires that states assess and describe the quality of the water every two years. Waters not meeting the requirements for their designated use (fishing, recreation or drinking water) are reported as being impaired, per section 303(d) of the CWA (GA EPD, 2010).

Two streams sampled, Tiger and Little Pine Knot, are both included on Georgia's 303(d) list as being impaired. Part of the process to restore these streams to their designated use involves creating a total maximum daily load (TMDL) plan (GA EPD, 2010). TMDLs are required as part of the CWA section 303 (d) (USEPA, 2010c; USEPA, 2009). Essentially, TMDLs are plans that document methods and procedures to restore impaired streams back to their designated use (USEPA, 2010d). The State TMDLs for Tiger and Little Pine Knot creeks do not require any reduction in their sediment loads to restore them to their designated use (GA DNR, 2005). It is believed that the streams will repair themselves naturally if no additional pollutants are introduced into the system. Fort Benning is currently establishing TMDLs for these streams to comply with

NPDES regulations and to ensure that no further degradation occurs (Taylor and Baswell, 2010).

Geology

The geology of the study areas is located on the Coastal Plain Province that comprises most of the southern part of the state of Georgia. It is composed of sediments that were deposited during the Late Cretaceous Period of the Mesozoic Era. The strata in the area are composed mainly of sandstones, mudstones and shales (Frazier, 2009). Five different formations compose the watersheds studied; Tuscaloosa, Eutaw, Blufftown, Cusseta, and Ripley Formations (listed oldest to youngest). A geologic map (Figure 6) shows the distribution of these different formations within the study area. The brief descriptions of the formations listed below were taken from several resources which include: Frazier and Taylor, 1980; Reinhardt and Gibson, 1981; Reinhardt, 1986; Frazier, 2009.

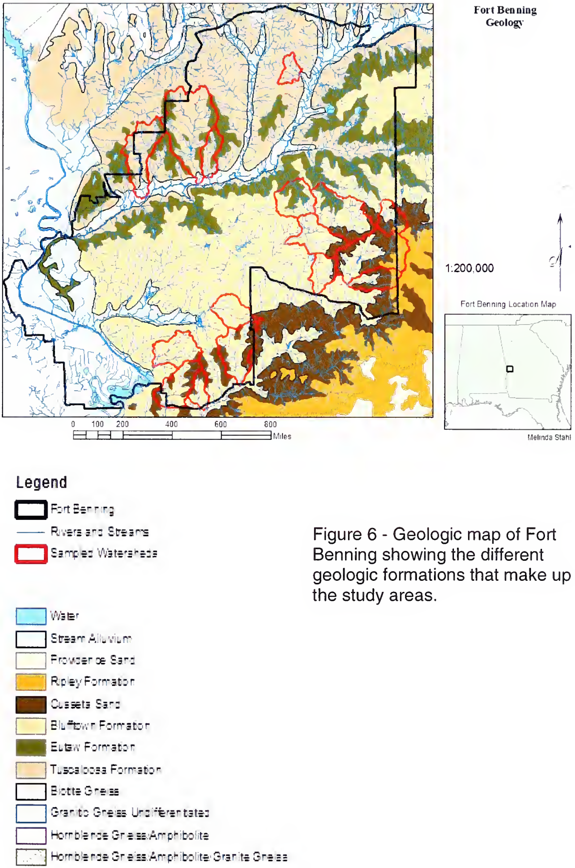


Figure 6 - Geologic map of Fort Benning showing the different geologic formations that make up the study areas.

The oldest formation, the Tuscaloosa, is represented by sequences of deposits that consist of coarse grain sands that grade upward into fine sands, followed by silt and capped with mudstone (Frazier, 2009). This sequence of deposits is repeated in multiple layers. The formation varies in thickness and can range from 100 meters (330 feet) to 300 meters (1,000 feet) (Reinhardt and Gibson, 1981; Reinhardt, 1986; Frazier, 2009). The watersheds in the Muscogee County study area are dominated by this formation.

The Eutaw Formation overlies the Tuscaloosa, which was deposited after an unconformity. The Eutaw is primarily composed of coarse-grained, cross-bedded sandstones and silty mudstones interbedded with fine-grained sandstones. Fossils are commonly found in the mudstone portion of this formation. The thickness of this formation is 30 to 45 meters (100-150 feet) (Frazier and Taylor, 1980; Reinhardt and Gibson, 1981; Reinhardt, 1986; Frazier, 2009) and is part of five of the watersheds studied (Tiger, Wolf, Long Branch, Bonham, and Sally Branch Watersheds).

The Blufftown Formation is very similar to the Eutaw with interbedded sandstones with silty and clayey mudstones and shales. However, the Eutaw is darker in color from fine organic materials and bioturbation (mixing of sediment) from organisms living within the sediment at the time of deposition (Reinhardt and Gibson, 1981; Reinhardt, 1986; Frazier, 2009). The watersheds in Chattahoochee County are dominated by the Blufftown Formation.

The Cusseta Formation is also located in the Chattahoochee watersheds (with the exception of Bonham), although to a lesser extent than the Blufftown Formation. The Cusseta Formation is composed of coarse sands with large-scale cross-bedding. However, it also contains thinly bedded carbonaceous clays. The thickness varies in the formation but is typically less than 60 meters (200 feet) (Reinhardt and Gibson, 1981; Reinhardt, 1986; Frazier, 2009).

The youngest geologic formation within the study areas is the Ripley Formation. It is composed of bioturbated, micaceous, glauconitic fine sands. It is approximately 40 meters (135 feet) thick (Frazier and Taylor, 1980; Reinhardt and Gibson, 1981; Reinhardt, 1986; Frazier, 2009) and is located in the upland areas of Little Pine Knot, Hollis Creek and Hollis Branch Watersheds.

Soils

There are ten general soil classifications on Fort Benning, as taken from the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Chattahoochee (1997) and Muscogee (1983) soil survey manuals. These soils are of the Ailey-Troup-Vancluse, Bibb-Ochlockonee-Bigbee, Dothan-Organgeburg-Esto, Esto-Troup, Urban land-Dothan-Eunola, Urban land-Orangeburg-Esto, Urban land-Udorthents-Orangeburg, Nankin-Cowarts, Troup-Lakeland, and Troup-Nankin-Cowarts complexes. There are thirty-six different soil series identified within the study areas of this project. The K factors, or soil erodibility factors, ranged from 0.10 to

0.32 for soil series within the study watersheds, as defined by the soil survey manuals from the USDA NRCS. A complete breakdown of the soil series and K values are located in Appendix B.

METHODS

Site Selections:

Stream sites were chosen using watershed management unit (WMU) catchment maps created with ArcGIS 9.3 (ESRI Redlands, CA), using data provided by Fort Benning. The streams were evaluated according to multiple factors including their location within the WMU, training compartments, stream order, and accessibility. Site locations were selected as close to the bottom (drainage point) of the catchment as possible to ensure good representation of the watershed. Training compartments were also a factor in deciding locations of sites selected for the study. Several sites were not available due to the activity from training missions or the safety danger zone from training activities (Carmouche, Ruth, and Hastings Ranges). To ensure streams were able to be sampled safely, only 2^{nd} & 3^{rd} order streams (Strahler, 1952) were selected. In addition, each site was located near a road crossing or trail for accessibility. Additionally, care was taken with each site so that it was located outside (100 meters upstream or downstream) of any potential influence from road crossings such as culverts, bridges and low water crossings for the Army's Bradley Infantry Fighting Vehicles and Abrams Tanks as outlined in the operating procedure manual for RBPs (GA DNR, 2007).

Each stream site was delineated into a 100-meter reach in order to provide the best representation of the natural conditions of the stream. Flags were placed at the zero, fifty, and one-hundred meter marks within the reach of the site.

Total Suspended Solids Collection:

Techniques for collecting the water samples were obtained from the Macroinvertebrate Biological Assessment of Wadeable Streams in Georgia Standard Operating Procedures (SOP) (GA DNR, 2007). Water samples were taken in a 355ml (12 oz) bottle for total suspended solids provided by Environmental Research Laboratory (ERA) located in Auburn, Alabama. Clean hands/dirty hands technique was used in obtaining the water sample from the stream. The bottle was submerged to the middle of the water column, the cap was removed, the bottle filled, recapped and brought to the surface. The samples were then placed into a cooler with ice to be transported to the laboratory for analysis. Water samples were transported to the lab within four days of collection. ERA performed an SM 2540D modified test (low level 0.45 micron, Total Suspended Solids Dried at 103-105 Deg C) on the samples and reported results within two weeks.

Wolman Pebble Count Procedure:

A Wolman Pebble Count was performed at each of the sites. Each site had a pebble recorder and a pebble picker. One hundred pebbles were randomly picked up and measured according to the modified Wolman Pebble Count Procedure outlined in the SOP (GA DNR, 2007). Starting at the zero/one-hundred meter mark, pebbles were picked up randomly using the toe/finger touch technique. The entire reach was sampled by walking a zig-zag pattern, and the

fifty meter mark was used as a guide for the half way point during the pebble count. Pebbles were collected and measured either with a sand card or calipers depending upon the size of the grain/pebble. Several sites did not have exactly one hundred pebbles sampled; in these instances the number of pebbles in the category was divided by the total number sampled and multiplied by one hundred to obtain the percentage of each category counted in the reach of the channel. Both raw and corrected values of the pebble counts are shown in Appendix C.

Wolman pebble count data were also entered into a program used to analyze sediment samples derived from sieves or laser granulometer analysis (Gradistat Version 6.0, Berkshire, UK). Particles larger than 64mm (small cobbles) were omitted from the calculations due to limitations with the program.

BASINS Modeling:

BASINS, Better Assessment Science Integrating point and Non-point Sources, was downloaded from the United States Environmental Protection Agencies website (http://water.epa.gov/scitech/datait/models/basins/index.cfm). Data sets for HUC03130003, Middle Chattahoochee-Walter F. George Reservoir Watershed, were downloaded for use in ArcGIS.

ArcGIS 9.3:

ArcGIS 9.3 (ESRI Redlands, CA) was used to analyze watersheds on Fort Benning. Layers, features and images used in ArcGIS were downloaded from

the Internet (listed in the reference section under Data Web Sites), imported from the BASINS program, or provided by Fort Benning. Maps created for this project can be found in Appendix A.

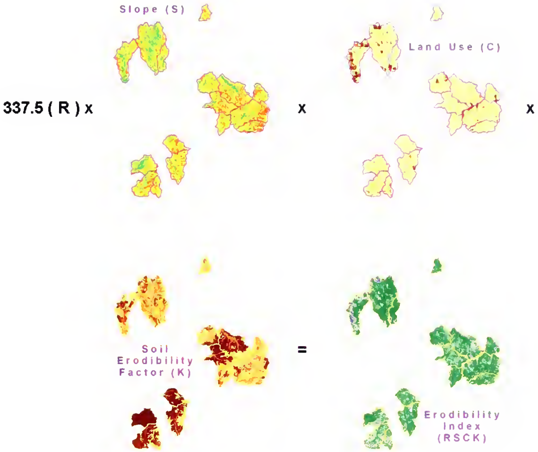
Watershed Boundaries: The watershed delineation file was transferred from the BASINS program to ArcGIS. Polygons were merged to create the watershed representing the area sampled. Several errors in the watershed polygon delineation were noticed within the BASINS file and were corrected in ArcGIS using a digital elevation model (provided by Fort Benning).

Land Use: A 2007 aerial photograph (provided by Fort Benning) was clipped to the watershed delineation feature files, where it was reclassified using Spatial Analyst into three categories; trees, grass/shrubs, and bare ground/trails. The reclassified image was then converted into a vector file and water features added to the layer. An Excel (Microsoft Corporation ® 2010) spreadsheet was created with the C values for each of the four categories (water, trees, grass/shrubs, and bare ground/trails). C values were determined using Table 10 from the USDA Agriculture Handbook #537 "Predicting Rainfall Erosion Losses, a Guide to Conservation Planning." The Excel file was joined with the Land Use feature file in ArcGIS where it was converted back into a raster file, based on the C value, using Spatial Analyst (using the same pixel size as the slope raster image provided by Fort Benning - 10-meter). This raster image is part of the equation (C) in the Soil Erodibility Index.

Soil K Values: An Excel spreadsheet was created listing the soil symbols for the counties along with the location and the K value. This file was joined with the soil feature file in ArcGIS. The file was then converted into a raster image using Spatial Analyst (10 meter pixel, matching the Land Use and Slope files). This raster image is part of the equation (K) in the Soil Erodibility Index.

Soil Erodibility Index: Using the portions of the RUSLE equation, a soil erodibility index was created using the raster calculator in ArcGIS. The average (337.5) rainfall index (R) for Muscogee (350) and Chattahoochee (325) counties was multiplied by the Slope (S), Land Use (C), and Soil Erodibility (K), Equation 2. The Length (L) factor was omitted from the equation due to the size and complexities of the watershed. The results were placed into 10 classes using quantile classification. Due to the difference in soils, both counties were evaluated independently. The reclassified images were converted into feature files and areas were computed for each of the 10 classes. Data generated from the raster calculation was exported into Microsoft Excel.

Data Analysis: Data was analyzed using SPSS (IBM © Somers, NY) software. TSS, Wolman Pebble Count (data generated from Gradistat), Slope (S), Land Use (C), Soil Erodibility (K), and soil erodibility index data (average value per watershed (SEI) as well as the percentage (SEI%) of the watersheds with >10 tons/acre year soil lost).



Equation 2 - A visual representation of the calculations followed to estimate the soil erodibility index equation

RESULTS

Watersheds ranged in size from 795 acres (322 ha) to 6,091 acres (2,465 ha). The names of the creeks that the physical data were taken from are used synonymously with the watershed.

Land use in the watersheds was classified into four categories; bare ground (or impervious surface), forest, shrub/grass, and water. Tiger, Orphan, Wolf, Long Branch, Hollis Creek, and Little Pine Knot watersheds were all classified with nine percent or more of the watershed containing bare ground/impervious surface (26.3%, 12.3%, 9.7%, 9.6%, and 9.2% respectively). Orphan, Sand, and Shell Creek watersheds all had over 40% shrub/grass (58.6%, 55.4%, and 42.9% respectively). Sand and Tiger Creek watersheds were the only two with less than 50% forest coverage (35.9%, 46.3% respectively). A complete table with acreage and percentages for all four classes is given in Appendix D.

Analysis of the watersheds revealed that the soil types are dominated by three different series. Twenty six percent of soils are Nankin sandy clay loam, 15% are Troup loamy sands, and 11% consist of the Cowarts and Ailey soil complex. Of these three the Nankin sandy clay loam complex had the highest erosion factor (K), 0.32. Shell and Oswichee watersheds were dominated by the Nankin complex with 92.8% and 70.1%, respectively. Halloca (52.2%), Sand Branch (49.6%), Hewell (48.8%), Sally Branch (41.7%), and Orphan (35.2%) watersheds also contained notable Nankin complex percentages. A complete table of the

soil description, K value, acreage and percentages of all soils within the watersheds is given in Appendix C and Appendix E.

Total Suspended Solids (TSS)

The average reading for TSS for the sites combined was 2.4 mg/L. Five of the sites were above average. Tiger Creek had the highest recorded value at 8 mg/L. The other four sites included Hewell Creek, Hollis Branch, Sally Branch and Shell Creek with readings of 4, 4, 3, and 3 mg/L respectively. Figure 7 is a comparison graph between the sampled sites.

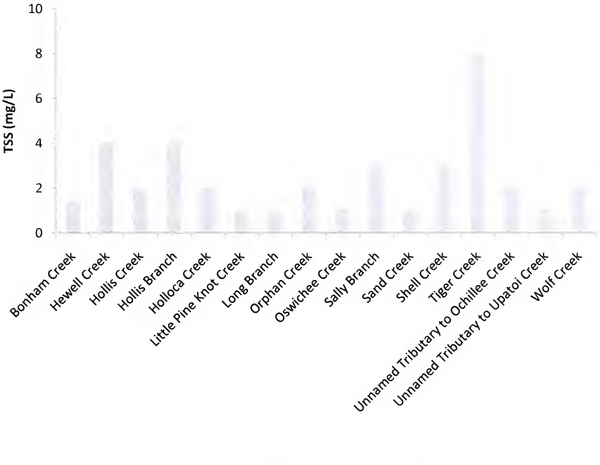


Figure 7 - Total Suspended Solids Comparison Graph (mg/L)

Wolman Pebble Count

Wolman pebble data were analyzed in Microsoft Excel to determine the cumulative percent of finer particles within the sample. Data representing the 50th percentile of the sample were used in the comparison; however, particles representing the 16th and 84th percentile were also taken into consideration, as they all represent the most standard statistical approach to evaluate the distribution of particle sizes (Rice and Church, 1996; Boggs, 2001; Olsen, 2005), Figure 8. Figure 9 is a graph representing these values for the sampled sites. A complete list of all the sampled sizes for each site is given in Appendix C.

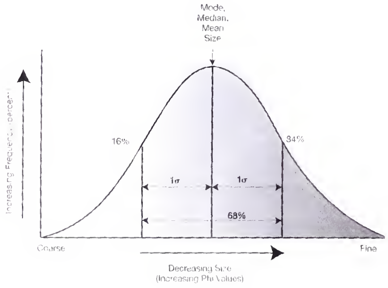


Figure 8 - Graph showing the locations of the Median (D50), 16% (D16) and 84% (D84) (Boggs, 2001).

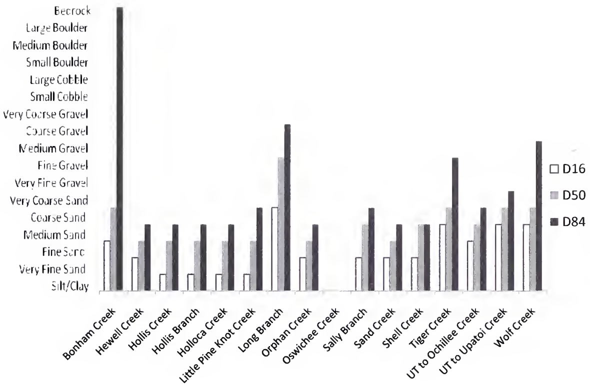


Figure 9 - Wolman Pebble Count Data, D16, D50 & D84 cumulative percent finer by site

Wolman pebble count data were also analyzed using Gradistat (Version 6.0, Berkshire, UK). All of the data results were either polymodal or trimodal. The author of the program states that the values calculated for skewness and kurtosis are unreliable and should not be used in analysis. Additionally, all but three watersheds had more than 5% of their respective grain samples showing particles smaller than 66 µm (clay and silt particles), and further analysis would be required for accuracy on the smaller-sized particles. Data produced from the program are available in Appendix C. It was determined that the data provided

by the program would be sufficient for use in establishing a relationship between finer grained sediments in the watersheds and results from the GIS modeling. D50 (grains representing 50% of the sample) and D10 (grains representing 10% of the sample) data produced from the program were used in the correlation analysis conducted in SPSS (Table 2).

Soil Erosion Index

The soil erosion index (SEI) created in ArcGIS produced values that indicate where high levels of soil loss are probable within the watershed. Figure 10 shows the percentage of the watershed that is represented with the highest level of soil loss produced by the equation (Muscogee County, 12 ton/acre year; Chattahoochee County, 21 ton/acre year). The difference between values with the counties is related to the soil series and their associated K values identified in the USDA, NRCS soil survey manuals.

Orphan (5.79%), Sand (6.00%), Shell (5.18%) (Chattahoochee County) and Tiger (7.66%) (Muscogee County) Creek watersheds all have the highest percentages of soil loss calculated. A complete list of results in both acreage and percentage of area is given in Appendix F.

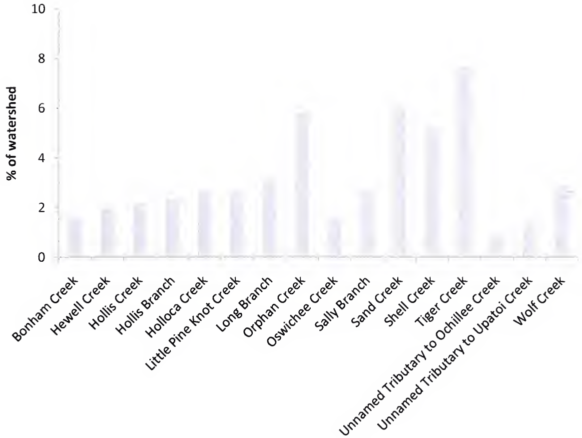


Figure 10 – Bar graph showing the Soil Erodibility Index (SEI) calculated for each watershed. Values shown are the percentage of individual watersheds that have an estimated soil loss greater than 10 ton/acre year.

Additionally, the average SEI value was calculated for each watershed (Figure 11) for comparison against physical data collected as well as the factors used to determine the SEI. Watersheds with the highest average were Tiger, Sand, Orphan and Shell.

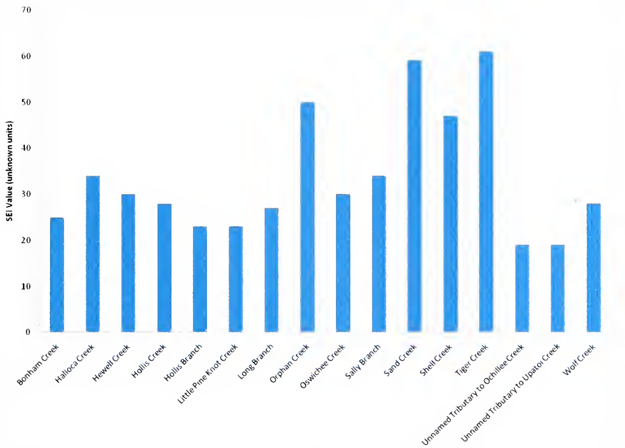


Figure 11 – Bar graph representing the average SEI calculated for each watershed, units are unknown and have no relevance with establishing a relationship with other variables.

Data Comparison

A correlation analysis was conducted with the data using SPSS (IBM © Somers, NY). Significant relationships exist between TSS and the percentage of the watershed with >10 ton/acre year soil loss ($r=0.525$, $p=0.037$) and the land coverage factor (C) ($r=0.646$, $p=0.007$). Relationships were also established between the Slope (S) and the D10 and D50 values from the Gradistat data ($r=-0.578$, $p=0.024$; $r=0.683$, $p=0.005$ respectively).

TSS		
SEI%	Pearson Correlation	0.525
	Sig. (2-Tailed)	0.037
C	Pearson Correlation	0.646
	Sig. (2-Tailed)	0.007

Table 1 -Correlation analysis results showing a significant relationship between TSS and the percentage of the watershed with >10 ton/acre year soil loss calculated and the land use factor (C) used in the soil erodibility index.

Slope (S)		
D50	Pearson Correlation	0.683
	Sig. (2-Tailed)	0.005
D10	Pearson Correlation	-0.578
	Sig. (2-Tailed)	0.024

Table 2 - Correlation analysis results indicating significant relationships between the slope and the D50 and D10 grain sizes (Gradistat) within the watersheds.

		Bonham Creek	Halloca Creek	Hewell Creek	Hollis Creek	Hollis Branch	Little Pine Knot Creek	Long Branch	Orphan Creek	Oswichee Creek	Sally Branch	Sand Creek	Shell Creek	Tiger Creek	Unnamed Tributary to Ochillee Creek	Unnamed Tributary to Upatoi Creek	Wolf Creek
Size (acres)		2199	2534	2873	4566	1575	1321	1279	949	1766	4049	2331	2214	3231	1410	795	6091
TSS (mg/L)		1	2	4	2	4	1	1	2	1	3	1	3	8	20	1	2
Wolman Pebble Data *	D_{16}	FS	S/C	VFS	S/C	S/C	S/C	CS	VFS	-	VFS	VFS	VFS	MS	FS	MS	MS
	D_{50}	CS	FS	FS	FS	FS	FS	FG	FS	-	MS	FS	MS	CS	MS	CS	CS
	D_{84}	BR	MS	MS	MS	MS	CS	CG	MS	-	CS	MS	MS	FG	CS	VCS	MG
Average Φ Scale		-2.7	2.4	2.3	2.7	2.5	2.4	-2.1	1.7	-	1.4	2.3	1.6	0.2	1.6	0.4	-0.5
Average C Value of Watershed		0.06	0.04	0.04	0.06	0.05	0.06	0.06	0.08	0.03	0.05	0.07	0.05	0.13	0.04	0.04	0.06
% of Area Forest		56.0	60.5	57.5	55.7	57.8	59.9	67.3	29.1	67.0	59.1	35.9	51.1	46.3	62.3	63.7	55.4
% of Area Bare Ground/Impervious Surface		8.7	4.8	4.9	9.3	6.0	9.2	9.6	12.3	2.8	5.3	8.4	5.9	26.3	4.2	3.9	9.7
Average K Value of Watershed		0.17	0.25	0.23	0.15	0.14	0.14	0.16	0.20	0.27	0.23	0.27	0.32	0.16	0.16	0.14	0.16
% of Area Nankin sandy clay loam		15.2	52.2	48.8	1.8	7.1	0	-	35.2	70.1	41.7	49.6	92.8	-	10.4	-	-
% of Area Troup loamy sand		39.7	9.6	24.6	14.5	17.0	30.9	0.8	37.5	10.2	9.8	12.6	0.1	11.1	38.6	7.9	5.8
% of Area Cowarts and Ailey Soils		21.6	9.4	5.9	23.8	41.4	40.3	-	9.6	6.4	8.5	1.5	-	-	30.2	-	-
Average S of Watershed		8.9	11.2	10.2	10.9	12.3	10.8	8.2	9.9	11.4	10.4	10.7	8.2	9.0	9.9	10.7	8.1
Soil Erodibility Index **		1.58	1.94	2.17	2.62	2.31	2.17	3.18	5.79	1.50	2.65	6.00	5.18	7.66	0.91	1.29	2.90
Soil Erodibility Index Ave Value		25	34	30	28	23	23	27	50	30	34	59	47	61	19	19	28

	** Wolman Pebble Data*	Diameter (mm)
S/C	Silt/Clay	<0.062
VFS	Very Fine Sand	0.062 - 0.125
FS	Fine Sand	0.125 - 0.249
MS	Medium Sand	0.25 - 0.49
CS	Coarse Sand	0.5 - .99
VCS	Very Coarse Sand	1 - 1.9
FG	Fine Gravel	4 - 7.9
MG	Medium Gravel	8 – 15.9
CG	Coarse Gravel	16 - 31.9
BR	Bedrock	>4095

** Percentage of Highest Value Calculated for Watershed

Table 3 -Selected data from study for comparison between watersheds and potential relationships between TSS, Wolman Pebble, Land Use, Dominant Soils, Soil Erodibility Index and factors used in equation as well as others used in discussion.

DISCUSSION

Watersheds were evaluated using physical data collected from the Fall, 2008 – Spring, 2009 season, TSS and Wolman Pebble Count data. Additionally, geographic information system (GIS) data were analyzed to create a soil erodibility index for comparison with the field collected data. The soil erodibility index was analyzed using two different values for the watersheds; SEI (the average soil loss within the watershed estimated as ton/acre year, and SEI% (the percentage of the watershed that had an estimated soil loss of more than 10 ton/acre year).

Physical Data

TSS was collected during “baseflow” conditions, as per the SOP, but may not represent the severity of the erosion occurring within the watershed. Baseflow is defined as water flowing in a stream as fed from groundwater, excluding surface runoff (Wyman & Stevenson, 2001). A study by Houser, Mulholland and Maloney (2006) found relationships between TSS and land disturbance with both baseflow and stormflow conditions, noting that particularly in urbanized areas TSS increased during a stormflow. Collecting water samples during or shortly after a rainfall event would provide more insight to the potential erosion occurring within the watersheds and help identify issues more accurately than collecting during baseflow.

Correlations have been established between TSS and water turbidity (Packman *et al.,* 1999; Balbach *et al.,* 2005; Gippel, 2006), and turbidity sampling would be more practical for collecting data for the watershed. However, "blackwater" creeks, which are darker in color as a result of leaching of organic materials, flow conditions, and low pH would produce higher Nephelometric Turbidity Units, NTU values (measurement of turbidity), than clear water creeks (Keller, 2010). There are several creeks on Fort Benning that are classified as blackwater creeks, and careful consideration should be given when performing tests on these streams.

Collection and analysis of turbidity readings from water samples provides quicker results and would be less expensive than the collection and analysis of TSS. As a side note, turbidity samples were collected during the 2008-2009 season; however, there were equipment, collection, and analysis issues that rendered the data inadequate for inclusion in this project.

Field data showed the highest TSS result in Tiger Creek. Possible explanations for having higher readings than the other watersheds sampled include the amount of urbanization as well as recent construction activity occurring within the watershed. Studies have found correlations between TSS in the watersheds and urbanization density (Wahl *et al.,* 1997; Wotling and Bourvier, 2002; Carle *et al.,* 2005). The Tiger Creek watershed has been active with construction over the past year related to the 2005 Defense Base Closure and Realignment Commission (BRAC).

Pebble data have been successfully used in monitoring streams for impacts from activities and land disturbances (Potyondy and Hardy, 2007) and are beneficial for evaluating potential issues within the watershed (Leigh, 2006). It is important to note that the pebble count sample only represents conditions for the 100-meter portion of the creek within the watershed, not the entire watershed.

The pebble data aligned closely with the soil erodibility values (K) of the different watersheds (Table 3). In 10 of the sampled streams, 84% of the sampled grains were less than a millimeter in diameter. Of the 10 streams, seven had medium sand (0.25-0.49mm diameter) representing the 84th percentile of the reach. Orphan, Hewell, and Sand Branch are all tributaries that feed into a 303d listed stream, Hitchitee Creek (located at the southern edge of the Installation border). The remaining four were Halloca, Hollis, Hollis Branch and Shell Creeks. All of these creeks are located in Chattahoochee County. Chattahoochee County has a significant amount of Nankin sandy clay loam, which has the highest erodibility value of all soil types in the study areas. However the correlation analysis conducted using SPSS did not indicate any significance between the soil erodibility values (K) and the D50 ($r=0.285$, $p=0.302$) or D10 ($r=-0.384$, $p=0.158$) grains (Gradistat data) within the watersheds.

The pebble data collected appear to reflect the characteristics of the sediments deposited during the Cretaceous period that dominate individual watersheds. Fort Benning is uniquely situated on the Fall Line with the northern-most portion in the Piedmont Region, which changes into Late Cretaceous Coastal Plain

depositional formations south of the Fall Line (USGS, 1996; Frazier, 2009). The study area contained five different stratigraphic units from the Upper Cretaceous; Tuscaloosa, Eutaw, Blufftown, Cusseta and Ripley Formations (oldest to youngest) with grain sizes ranging from coarse sands to clays (Frazier and Taylor, 1980; Reinhart and Gibson, 1981; Reinhardt, 1986; Frazier 2009). Results from the Wolman Pebble Count data collected are reflective of the geologic formations.

The four watersheds sampled in Muscogee County have portions of their headwaters in the Piedmont Region (Tiger, Long Branch, Wolf and a tributary to Upatoi Creek). These watersheds have larger-sized particles representing their composition when compared with the other streams. This is most likely related to the weathering of the Piedmont rock that has been transported and deposited within the geologic formations.

Bonham Creek was the only watershed that had notable bedrock counts in the Wolman Pebble Count survey. The section of the stream that was sampled within the watershed was cut down into a grey marl from the Eutaw formation that was deposited during the late Cretaceous period (Frazier and Taylor, 1980; Reinhardt and Gibson, 1981; Reinhardt, 1986; Frazier, 2009). Observations made during the survey of the stream noted that the banks of the stream were steep and sandy in sections and somewhat stabilized with tree roots. Results from this sampled portion of Bonham Creek indicate that the creek has incised through these deposited sediments from the farming era back into its original

channel. That would be consistent with results from a study which surveyed the valley in the Bonham Creek and Sally Branch watersheds. The study determined that approximately 1.4 – 2.4 metric tons of sediment, deposited during the 1920's farming era, covered the original floodplain (depth average ~174cm) (Imm *et al.,* 2009).

Sand Creek, located in the southwestern portion of Fort Benning, also had deeply incised banks. However, this stream was the opposite of what was observed with Bonham Creek. The banks of this stream were observed to be composed of grey clay containing many large fossils, *Exogyra ponderosa*, preserved in the clay which is part of the Blufftown Formation (Stephenson, 1956; Frazier and Taylor, 1980; Reinhardt and Gibson, 1981; Reinhardt, 1986; Frazier, 2009). However, the stream channel was filled with sediments that were washed into the system from the upland areas. This watershed also contained 49.6% of the highly erosive Nankin sandy clay loam soils.

Channel morphology was not taken into consideration as part of this study but it complement the data collected. Although the samples for Bonham Creek and Sand Creek represent only 100 meters per stream, observations of channel incision and sediment accumulation within the channels provide insight with respect to where erosion issues that directly affect water quality are occurring within the watershed (Casarim, 2010).

Tiger Creek and Little Pine Knot Creeks are both 303d listed streams within the Installation's boundaries. Little Pine Knot had fine sand (0.125-0.25mm diameter) and smaller sediment grains representing 50% of the sampled reach, whereas, Tiger Creek had coarse sand (0.5 – 1.0mm diameter) or smaller sediment grains representing 50% of the reach. Tiger Creek's results are most likely influenced by the geology of the region. However, there are also several detention ponds located along the stream throughout the watershed. These could be acting as sediment sinks that are preventing smaller particles from being transported downstream to the area sampled.

In addition to soil erodibility, a possible explanation for the sediment grain size within the channels of the streams sampled is that they more than likely represent the geomorphological changes that are occurring in the streams (Harman *et al.,* 2007; Steichen *et al.,* 2008; Casarim, 2010). Years of poor farming practices and lack of BMPs have resulted in several streams having wide, deeply incised channels with unstable banks (Steichen *et al.,* 2008; Imm *et al.,* 2009). A study of Sally Branch and Bonham Creek by Casarim (2010) determined these two floodplains were buried an average of 179cm as a result from the poor farming practices during the Cotton Era.

Relationships were also observed between the D50 and D10 Gradistat data and slope of the watershed (Table 2). These results show that the D10 has a negative relationship whereas the D50 relationship is positive. The relationships imply that particles which are transported most easily within a watershed (D10)

are finer in size with steeper sloped watersheds and increase in size as the slope decreases, whereas sediments that make up 50% of the sampled channel (D50) increase in size as the slope increases. Combined with the knowledge that water velocity increases with slope, these results align closely with Hjulstr□m's Curve and the relationship between the transportation of sediment sizes and velocity (Hsü, 2004).

GIS Data

Land use was classified using a 2007 aerial photograph. Due to the size and location of the watersheds, the 2009 image did not show enough detail outside of the Installation border to be used for classification purposes. On the aerial images, it was difficult to distinguish between bare ground and impervious surfaces. Therefore, they were classified as the same. The combination of these two classes had negligible results on all the watersheds with the exception of the Tiger Creek watershed; a large portion of its watershed had impervious surfaces from the residential areas (outside of the Installation boundary) and cantonment areas (within the Installation). This resulted in the Tiger Creek watershed having a higher amount of bare ground and higher percentage of the watershed calculated for soil loss potential. Aerial and land use maps created can be found in Appendix A.

Although there are several different methods that can be used to classify land use (Anderson *et al.,* 1976), the purpose of this study was to use the aerial

imagery for classification. This method creates procedures based on data that are readily available and reproducible for potential future use. However, if resources are available, the combination of thematic imagery along with high-resolution orthophotos would yield more accurate results for land use classification (Geneletti and Gorte, 2003).

Land coverage and the LS factor in the RUSLE equation have significant impacts on the results (Risse *et al.,* 1993). Although the factors within RUSLE are not always accurate for estimates, the equation can be creatively manipulated to provide a better representation of the data. Steichen *et al.* (2008) successfully developed an additional factor in place of the P factor to represent military training impacts on the soil. Van Remortel *et al.* (2004) wrote a program to assist in the errors of the LS factor over large areas. This study used a different approach by eliminating the L factor.

The correlation analysis conducted on the data for this project indicates a significant relationship between the land coverage factor (C) and the SEI% (Table 1). No relationships were established between the slope (S) ($r=-0.316$, $p=0.233$) or the soil erodibility factor (K) ($r=0.242$, $p=0.366$) and the SEI%.

RUSLE does not provide the ability to predict sediment deposition or soil erosion caused by gullies, stream banks and stream beds (Renard *et al.,* 1997; GASWCC, 2000). Given the prevalence of those geological features in the study areas, RUSLE is missing additional factors to account for the accelerated

erosional features within this project's watersheds. Although the index created for this project is not conclusive and does not represent all areas of concern in the watersheds, the relationship established between TSS and SEI% indicates that it does provide a beneficial model that can be expanded to evaluate water quality monitoring areas. The results provide output maps that are more useful in showing areas with higher erosion rates. This approach provides a practical output for watershed evaluation. Further improvements can be made to this model by incorporating an index for military land use within each of the watersheds.

Data Comparison

Although soil erosion is a natural process, studies have shown that military use can accelerate this process (B□hm, 2003; Steichen *et al.,* 2008). Negative impacts from soil erosion can be controlled if the areas with the highest erosion potential are identified (Gaffer *et al.,* 2008). Results of soil-erosion index maps show areas of potential for soil loss in each of the watersheds evaluated.

Relationships established between TSS, the SEI%, and the land use factor indicate that there is potential for estimating water quality within the watersheds. The soil erodibility index model created for this analysis provides an estimate of soil loss in the area; however other factors are needed to refine the equation to better represent the ground disturbance activities occurring on Fort Benning (training exercises, controlled burns, unimproved road/trails) that are not

accounted for with RUSLE. Furthermore, the relationship that was established between TSS and land use was slightly stronger than the relationship between TSS and the SEI%, indicating that a simple land classification image could also be used to estimate water quality.

Sand Branch, Shell, Tiger and Orphan Creek watersheds all had the largest potential soil loss areas (five percent or more of the area with >10 ton/acre year). Interestingly, these watersheds also had less than 55% forest coverage and had medium sand as measured by the pebble count data (84% of the sample having grains less than half a millimeter in diameter).

Relationships established between the slopes of the watershed and the D10 and D50 grain sizes are most likely related to stream discharge. Cross sectional data and velocity measurements were collected during the RBP study; however, data was incomplete for many of the streams and could not be included to determine any further relationships.

CONCLUSIONS

The purpose of this study was to determine if relationships exist between the physical measurements of total suspended solids (TSS) and Wolman Pebble Count data and the GIS-derived soil erodibility index. Correlation analysis of the data indicated relationships between TSS, SEI%, and land use. These results imply that it is possible to estimate water quality using the soil erodibility index model created for this project as well as analyzing a simple land use classification of a watershed.

The equation used for the soil erodibility index provides a useful map to help identify areas within the watersheds where best management practices would be best utilized. However, developing and incorporating different indices that could be factored into the equation to account for additional land disturbance activities that are not covered by RUSLE would improve the SEI. Military land use, controlled burns, and unimproved roads indices are a few factors that have impacts on erosion. Additionally, methods to locate, measure and track gully development and growth would be beneficial in watershed management and water quality.

Testing for water turbidity versus TSS would yield quicker results in future assessments. Pebble data collected did not vary greatly between sampled streams and is reflective of the geologic formations. Sampling the stream in several sections throughout the watershed would provide a better analysis as

well as indicate areas of greater concern. Additionally, because of the geology of the region, sediment core samples pulled from the stream beds and specifically from the sand bars (areas of deposition), ripples, and pools would provide a better representation of the sediment that is being transported within the system. The 303d listed stream data collected did not indicate any outlying parameters to help identify potential issues in streams.

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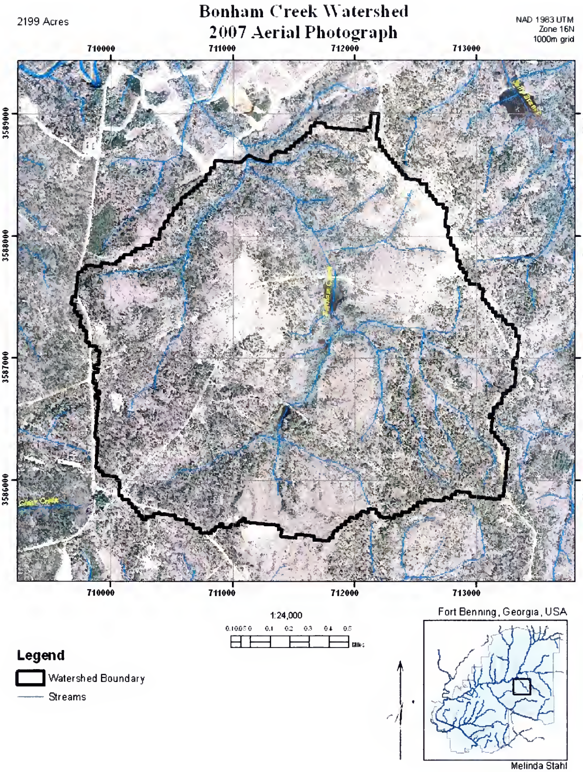
APPENDICES

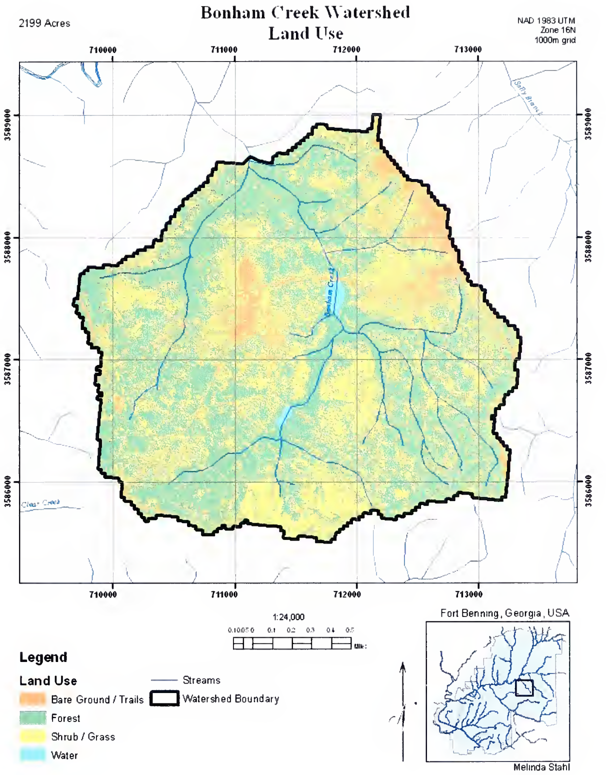
APPENDIX A – Watershed Maps

Watershed Map Scale and Acreage

Watershed	Map Scale	Area (Acres)
Bonham Creek	1:24,000	2,199
Halloca Creek	1:36,000	2,534
Hewell Branch Creek	1:36,000	2,873
Hollis Branch Creek	1:24,000	1,575
Hollis Creek	1:36,000	4,566
Little Pine Knot Creek	1:24,000	1,321
Long Branch Creek	1:24,000	1,279
Orphan Creek	1:24,000	949
Oswichee Creek	1:24,000	1,766
Sally Branch Creek	1:36,000	4,049
Sand Branch Creek	1:24,000	2,331
Shell Creek	1:24,000	2,241
Tiger Creek	1:36,000	3,231
Tributary to Ochillee Creek	1:24,000	1,410
Tributary to Upatoi Creek	1:24,000	795
Wolf Creek	1:50,000	6,091

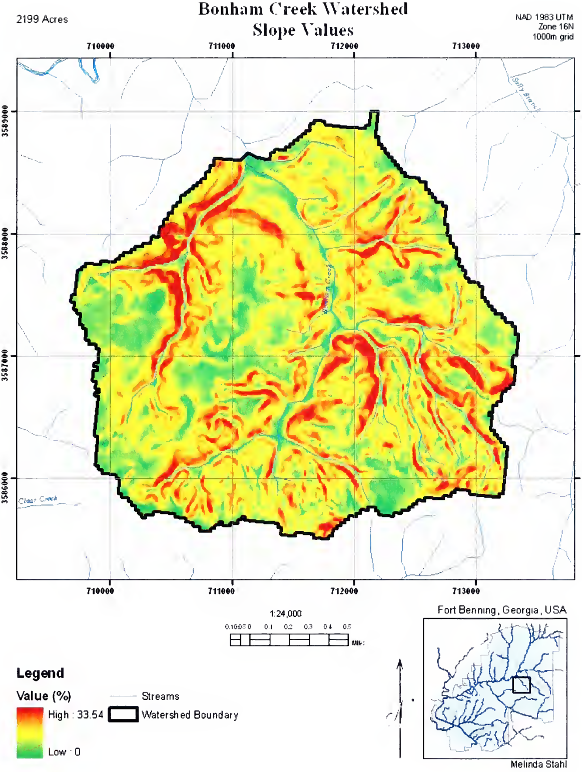
Bonham Creek Watershed Maps

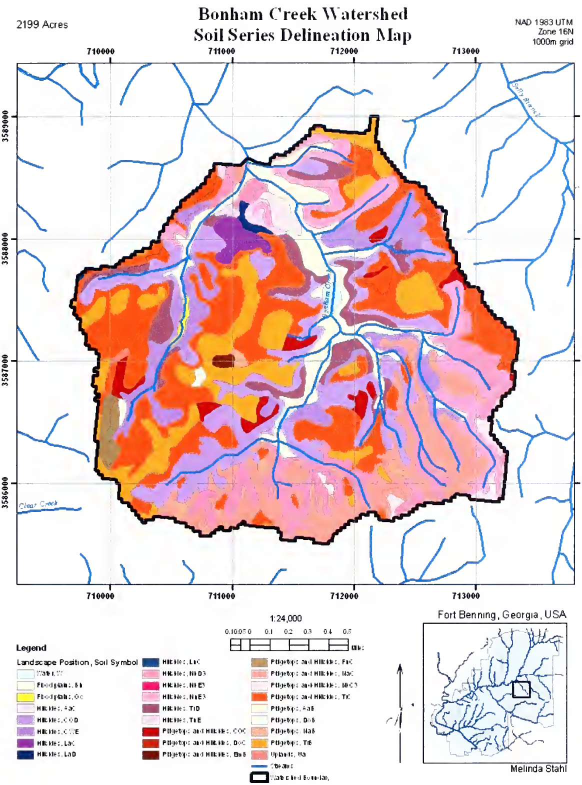

Bonham Creek Watershed
2007 Aerial Photograph
2199 Acres
NAD 1983 UTM
Zone 16N
1000m grid
710000
711000
712000
713000
3589000
3588000
3587000
3586000
1:24,000
Miles
Fort Benning, Georgia, USA
Legend
Watershed Boundary
Streams
Melinda Stahl



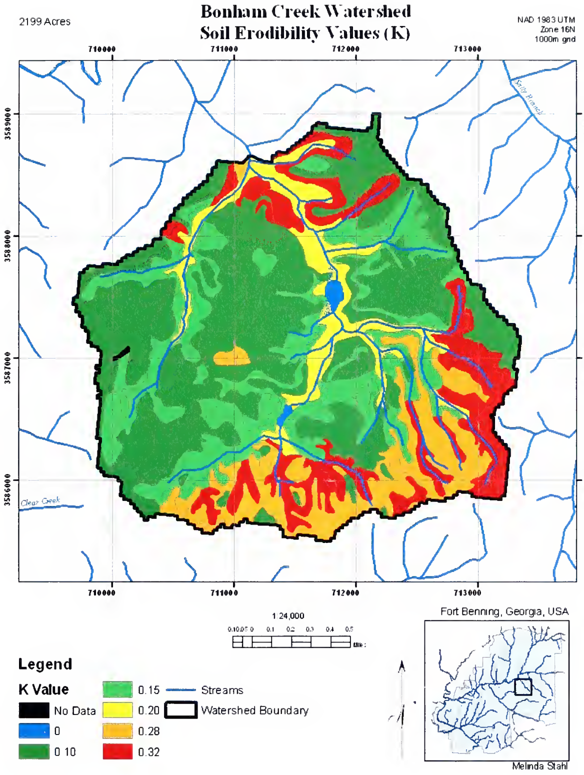
Bonham Creek Watershed
Land Use
2199 Acres
NAD 1983 UTM
Zone 16N
1000m grid
710000
711000
712000
713000
3589000
3588000
3587000
3586000
Bonham Creek
Soffy Branch
Clear Creek
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Miles
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

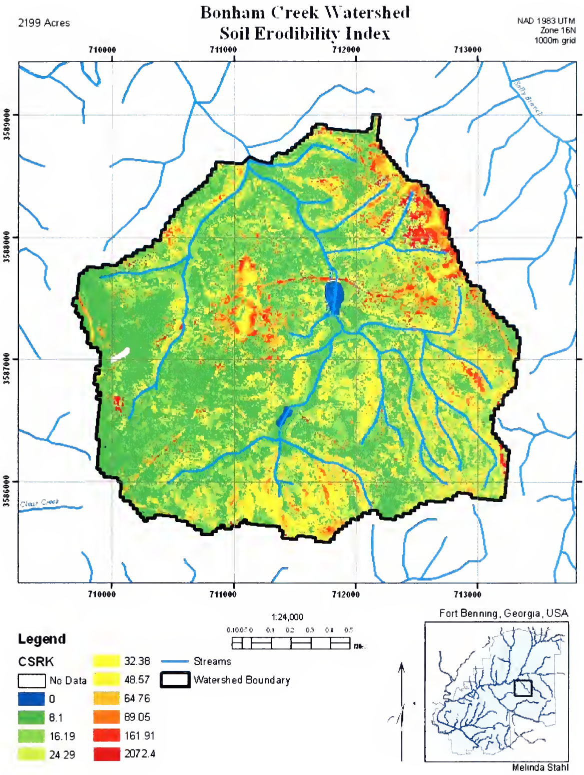
Bonham Creek Watershed
Slope Values



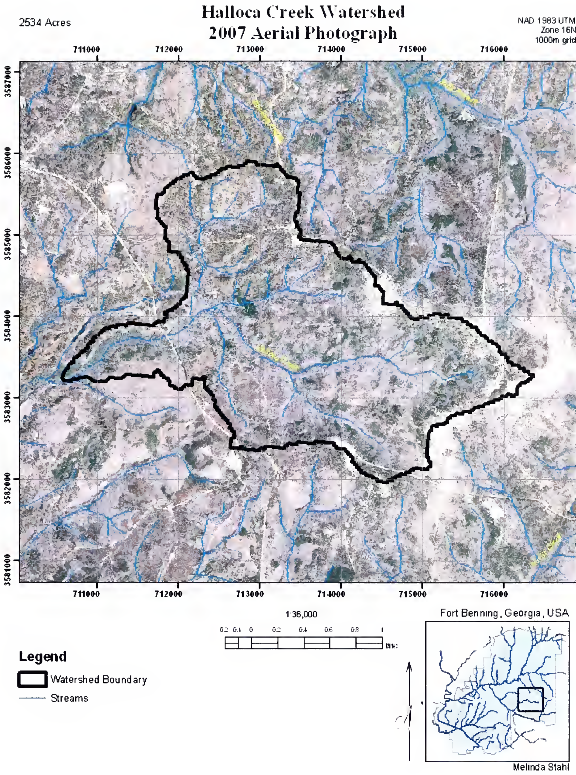


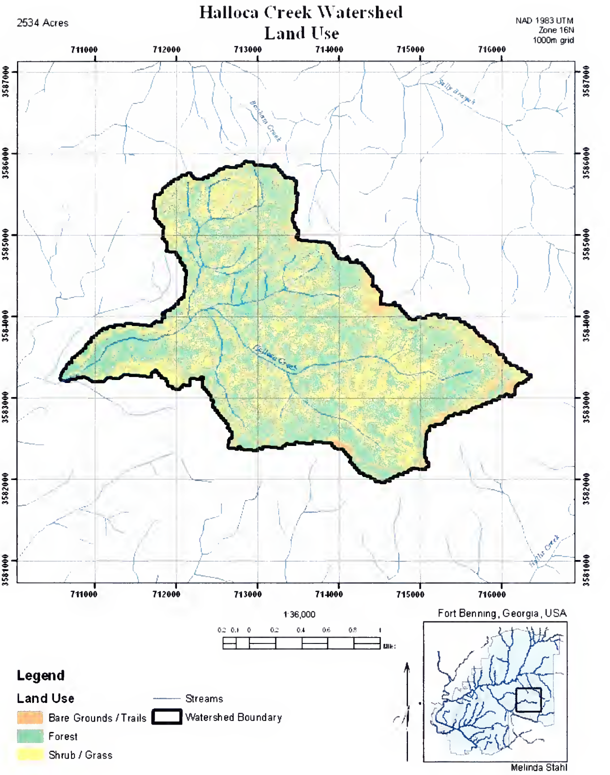
Bonham Creek Watershed
Soil Series Delineation Map
2199 Acres
NAD 1983 UTM
Zone 16N
1000m grid
710000
711000
712000
713000
3589000
3588000
3587000
3586000
Clear Creek
1:24,000
Legend
Landscape Position, Soil Symbol
Fort Benning, Georgia, USA
Melinda Stahl


2199 Acres
Bonham Creek Watershed
Soil Erodibility Values (K)
NAD 1983 UTM
Zone 16N
1000m grid
710000
711000
712000
713000
3589000
3588000
3587000
3586000
Clear Creek
1:24,000
Fort Benning, Georgia, USA
Legend
K Value
No Data
0
0.10
0.15
0.20
0.28
0.32
Streams
Watershed Boundary
Melinda Stahl

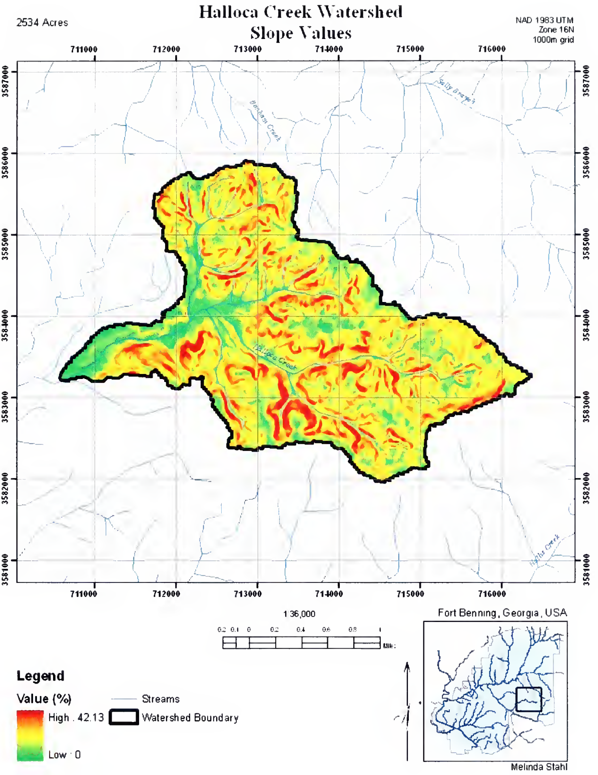

2199 Acres
Bonham Creek Watershed
Soil Erodibility Index
NAD 1983 UTM
Zone 16N
1000m grid
710000
711000
712000
713000
3589000
3588000
3587000
3586000
Clear Creek
1:24,000
Legend
CSRK
No Data
0
8.1
16.19
24 29
32.38
48.57
64 76
89 05
161 91
2072.4
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

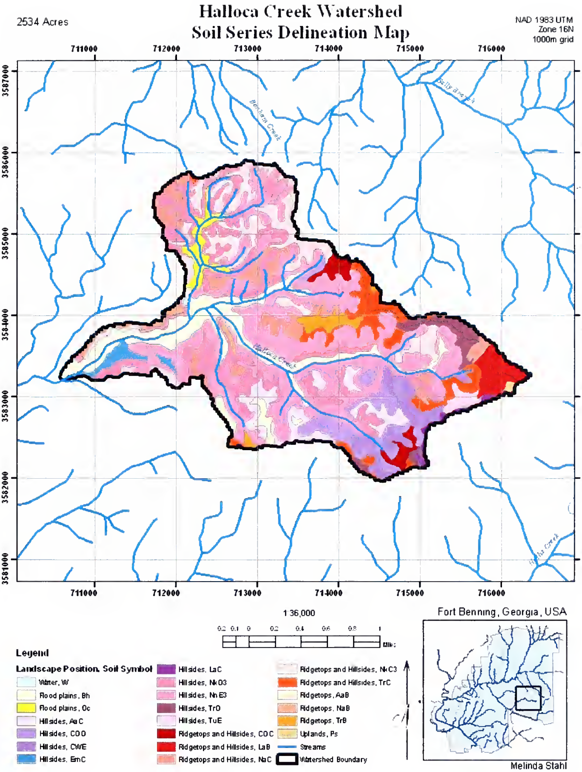
Halloca Creek Watershed Maps


Halloca Creek Watershed
2007 Aerial Photograph
2534 Acres
NAD 1983 UTM
Zone 16N
1000m grid
711000
712000
713000
714000
715000
716000
3587000
3586000
3585000
3584000
3583000
3582000
3581000
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Legend
Watershed Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl

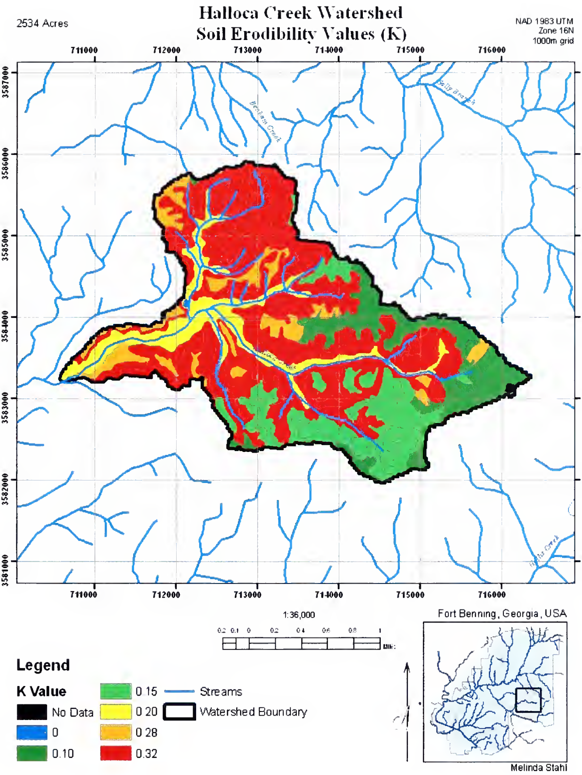


Halloca Creek Watershed
Land Use
2534 Acres
NAD 1983 UTM
Zone 16N
1000m grid
711000
712000
713000
714000
715000
716000
3587000
3586000
3585000
3584000
3583000
3582000
3581000
Halloca Creek
1:36,000
Miles
Legend
Land Use
Bare Grounds / Trails
Forest
Shrub / Grass
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl


Halloca Creek Watershed
Slope Values
2534 Acres
NAD 1983 UTM
Zone 16N
1000m grid
711000
712000
713000
714000
715000
716000
3587000
3586000
3585000
3584000
3583000
3582000
3581000
Halloca Creek
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Fort Benning, Georgia, USA
Legend
Value (%)
High : 42.13
Low : 0
Streams
Watershed Boundary
Melinda Stahl



Halloca Creek Watershed
Soil Series Delineation Map
2534 Acres
NAD 1983 UTM
Zone 16N
1000m grid
711000
712000
713000
714000
715000
716000
3587000
3586000
3585000
3584000
3583000
3582000
3581000
Halloca Creek
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Fort Benning, Georgia, USA
Legend
Landscape Position, Soil Symbol
Water, W
Flood plains, Bh
Flood plains, Oc
Hillsides, AaC
Hillsides, COD
Hillsides, CWE
Hillsides, EmC
Hillsides, LaC
Hillsides, NkD3
Hillsides, NnE3
Hillsides, TrD
Hillsides, TuE
Ridgetops and Hillsides, COC
Ridgetops and Hillsides, LaB
Ridgetops and Hillsides, NaC
Ridgetops and Hillsides, NkC3
Ridgetops and Hillsides, TrC
Ridgetops, AaB
Ridgetops, NaB
Ridgetops, TrB
Uplands, Ps
Streams
Watershed Boundary
Melinda Stahl


2534 Acres
Halloca Creek Watershed
Soil Erodibility Values (K)
NAD 1983 UTM
Zone 16N
1000m grid
711000
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713000
714000
715000
716000
3587000
3586000
3585000
3584000
3583000
3582000
3581000
1:36,000
Miles
Legend
K Value
No Data
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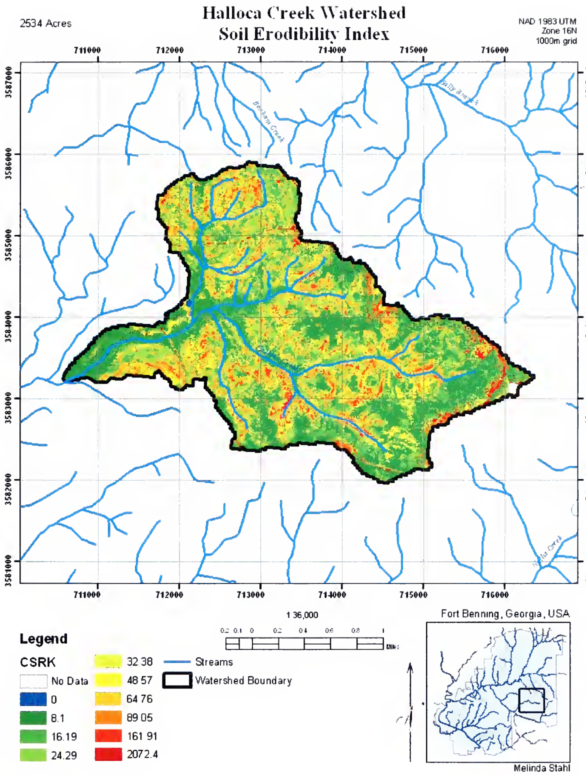
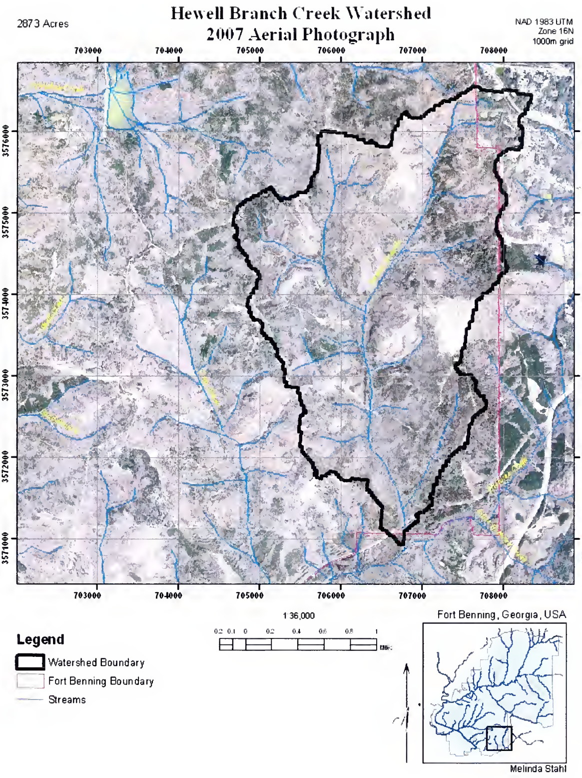
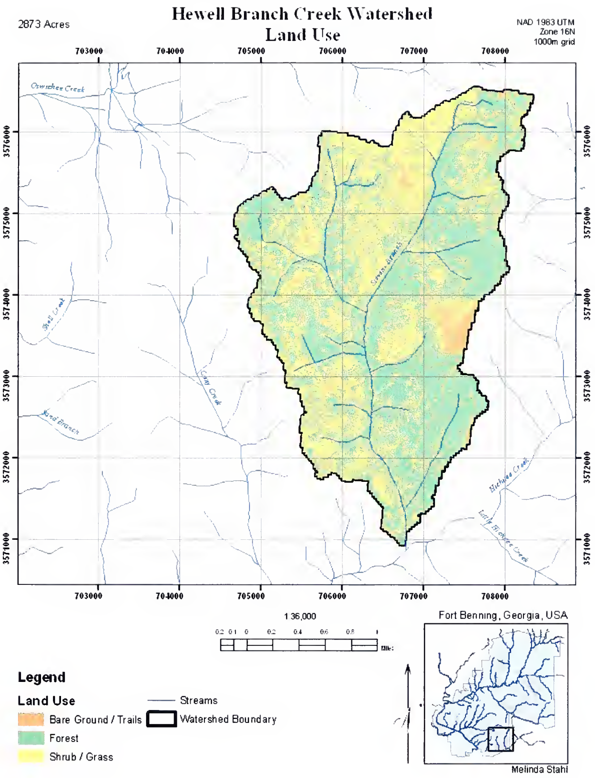
0.10
0.15
0.20
0.28
0.32
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

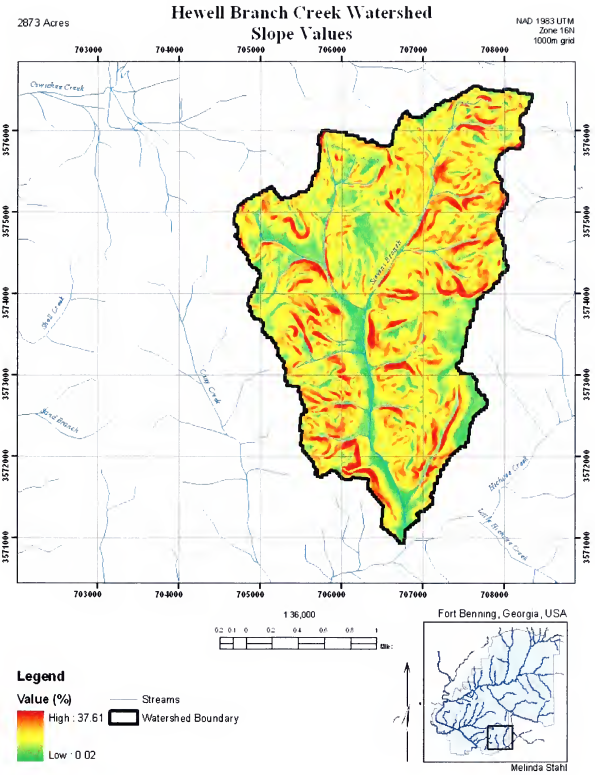

Halloca Creek Watershed
Soil Erodibility Index
2534 Acres
NAD 1983 UTM
Zone 16N
1000m grid
711000
712000
713000
714000
715000
716000
3587000
3586000
3585000
3584000
3583000
3582000
3581000
Bonham Creek
Sally Branch
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Legend
CSRK
No Data
0
8.1
16.19
24.29
32.38
48.57
64.76
89.05
161.91
2072.4
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

Hewell Branch Creek Watershed Maps

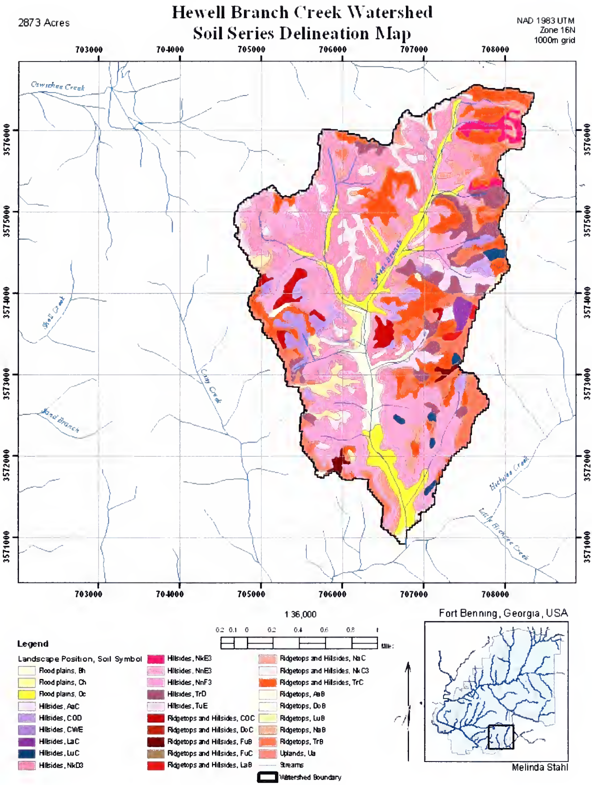


Hewell Branch Creek Watershed
2007 Aerial Photograph
2873 Acres
NAD 1983 UTM
Zone 16N
1000m grid
703000
704000
705000
706000
707000
708000
3576000
3575000
3574000
3573000
3572000
3571000
Legend
Watershed Boundary
Fort Benning Boundary
Streams
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Fort Benning, Georgia, USA
Melinda Stahl

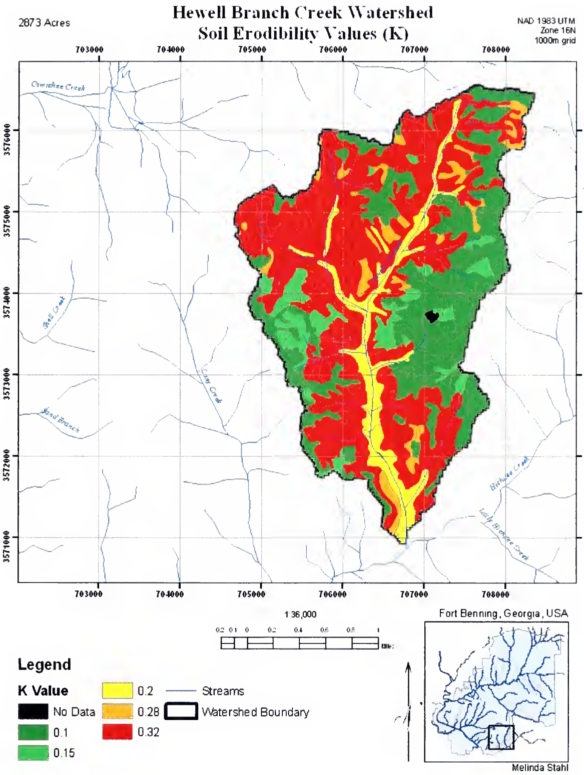

Hewell Branch Creek Watershed
Land Use
2873 Acres
NAD 1983 UTM
Zone 16N
1000m grid
703000
704000
705000
706000
707000
708000
3576000
3575000
3574000
3573000
3572000
3571000
Oswichee Creek
Hichitee Creek
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Fort Benning, Georgia, USA
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Streams
Watershed Boundary
Melinda Stahl

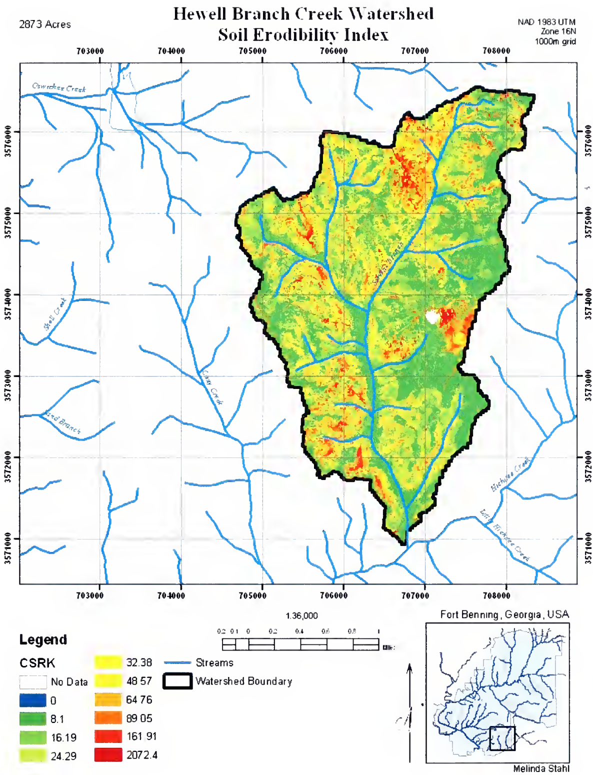


Hewell Branch Creek Watershed
Slope Values
2873 Acres
NAD 1983 UTM
Zone 16N
1000m grid
703000
704000
705000
706000
707000
708000
3576000
3575000
3574000
3573000
3572000
3571000
Oswichee Creek
Shell Creek
Sand Branch
Hichitee Creek
1 36,000
Fort Benning, Georgia, USA
Legend
Value (%)
High : 37.61
Low : 0.02
Streams
Watershed Boundary
Melinda Stahl



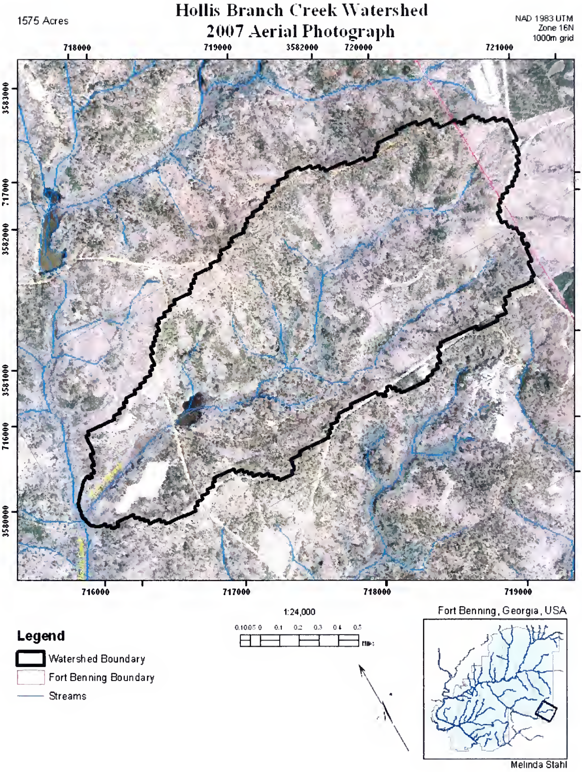
Hewell Branch Creek Watershed
Soil Series Delineation Map
2873 Acres
NAD 1983 UTM
Zone 16N
1000m grid
703000
704000
705000
706000
707000
708000
3576000
3575000
3574000
3573000
3572000
3571000
Oswichee Creek
Bull Creek
Sand Branch
Cany Creek
Hichitee Creek
Little Hichitee Creek
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Fort Benning, Georgia, USA
Melinda Stahl
Legend
Landscape Position, Soil Symbol
Flood plains, Bh
Flood plains, Ch
Flood plains, Oc
Hillsides, AaC
Hillsides, COD
Hillsides, CWE
Hillsides, LaC
Hillsides, LuC
Hillsides, NkD3
Hillsides, NkE3
Hillsides, NnE3
Hillsides, NnF3
Hillsides, TrD
Hillsides, TuE
Ridgetops and Hillsides, COC
Ridgetops and Hillsides, DoC
Ridgetops and Hillsides, FuB
Ridgetops and Hillsides, FuC
Ridgetops and Hillsides, LaB
Ridgetops and Hillsides, NaC
Ridgetops and Hillsides, NkC3
Ridgetops and Hillsides, TrC
Ridgetops, AaB
Ridgetops, DoB
Ridgetops, LuB
Ridgetops, NaB
Ridgetops, TrB
Uplands, Ua
Streams
Watershed Boundary

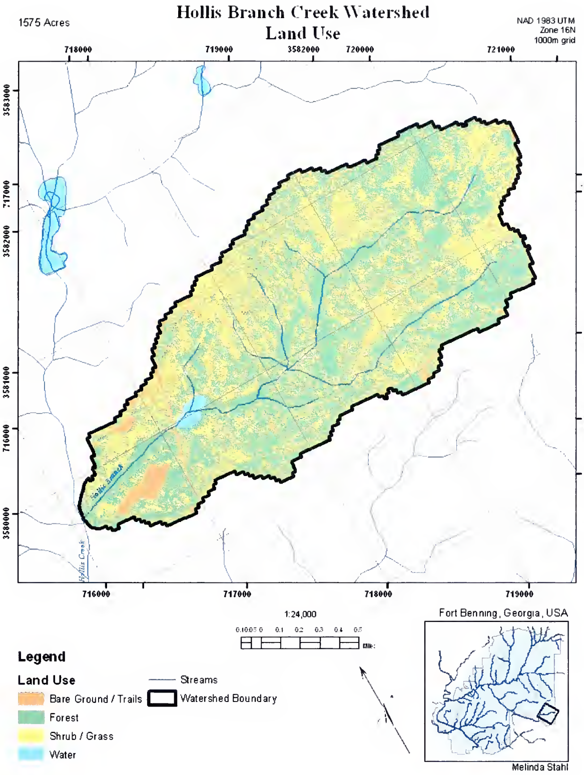

Hewell Branch Creek Watershed
Soil Erodibility Values (K)
2873 Acres
NAD 1983 UTM
Zone 16N
1000m grid
703000
704000
705000
706000
707000
708000
3576000
3575000
3574000
3573000
3572000
3571000
Oswichee Creek
Bird Branch
Hichitee Creek
Little Hichitee Creek
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Fort Benning, Georgia, USA
Legend
K Value
No Data
0.1
0.15
0.2
0.28
0.32
Streams
Watershed Boundary
Melinda Stahl



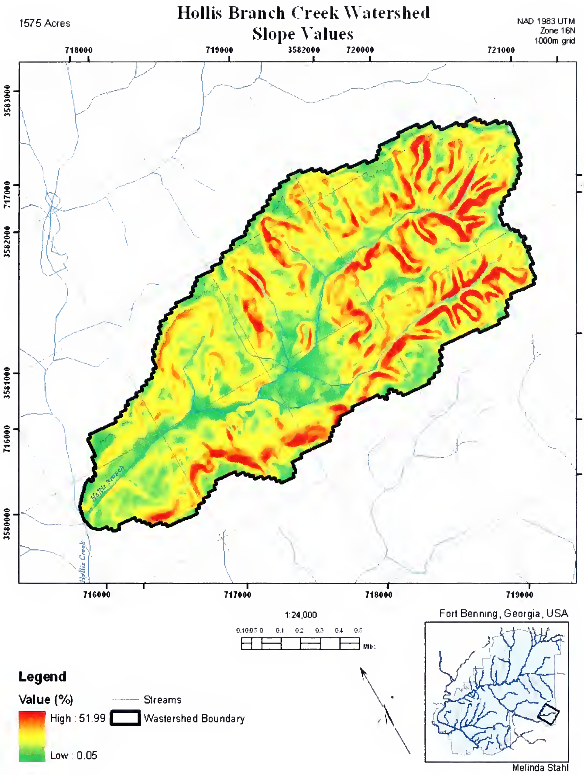
Hewell Branch Creek Watershed
Soil Erodibility Index
2873 Acres
NAD 1983 UTM
Zone 16N
1000m grid
703000
704000
705000
706000
707000
708000
3576000
3575000
3574000
3573000
3572000
3571000
Oswichee Creek
Fort Benning, Georgia, USA
1:36,000
Miles
Legend
CSRK
No Data
0
8.1
16.19
24.29
32.38
48.57
64.76
89.05
161.91
2072.4
Streams
Watershed Boundary
Melinda Stahl

Hollis Branch Creek Watershed Maps


Hollis Branch Creek Watershed
2007 Aerial Photograph
1575 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
3582000
720000
721000
3583000
717000
3582000
3581000
716000
3580000
721000
3579000
720000
3578000
716000
717000
718000
719000
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Legend
Watershed Boundary
Fort Benning Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl



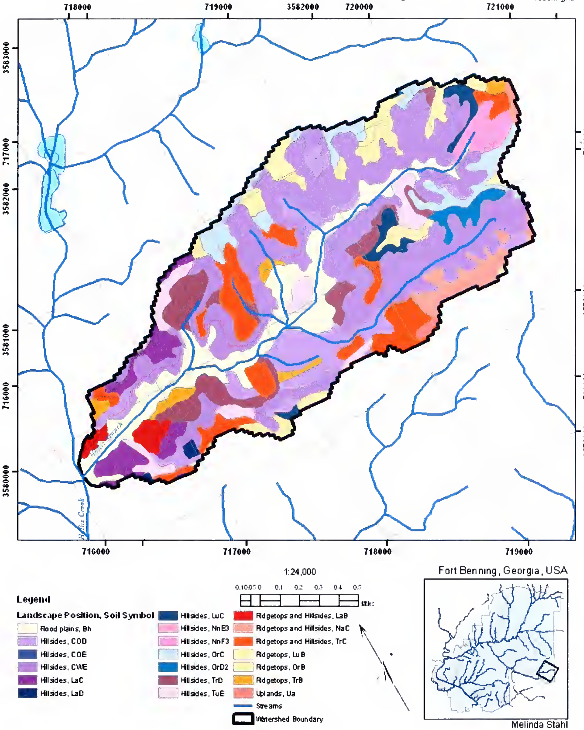
Hollis Branch Creek Watershed
Land Use
1575 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
3582000
720000
721000
3583000
717000
3582000
3581000
716000
3580000
721000
3579000
720000
3578000
716000
717000
718000
719000
To the Branch
Hollis Creek
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Miles
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl


Hollis Branch Creek Watershed
Slope Values
1575 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
3582000
720000
721000
3583000
717000
3582000
3581000
716000
3580000
721000
3579000
720000
3578000
716000
717000
718000
719000
Hollis Branch
Hollis Creek
1:24,000
0.1005 0 0.1 0.2 0.3 0.4 0.5
Miles
Fort Benning, Georgia, USA
Legend
Value (%)
High : 51.99
Low : 0.05
Streams
Wastershed Boundary
Melinda Stahl

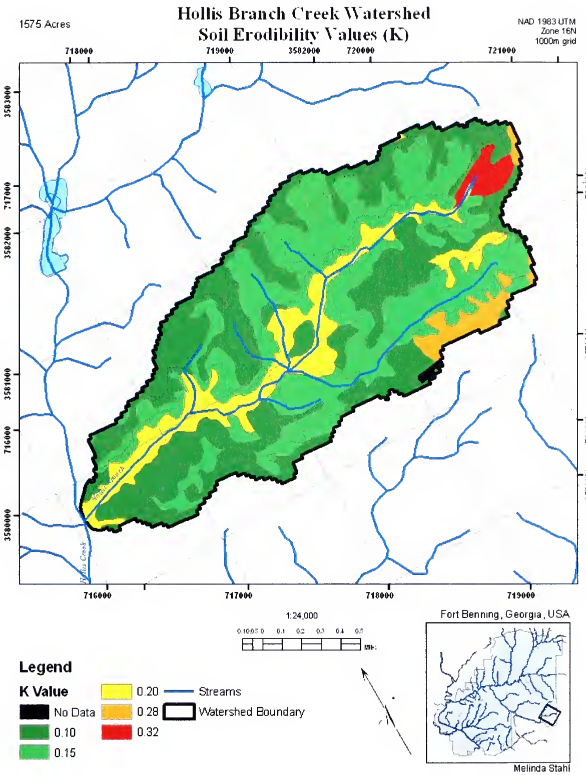
1575 Acres

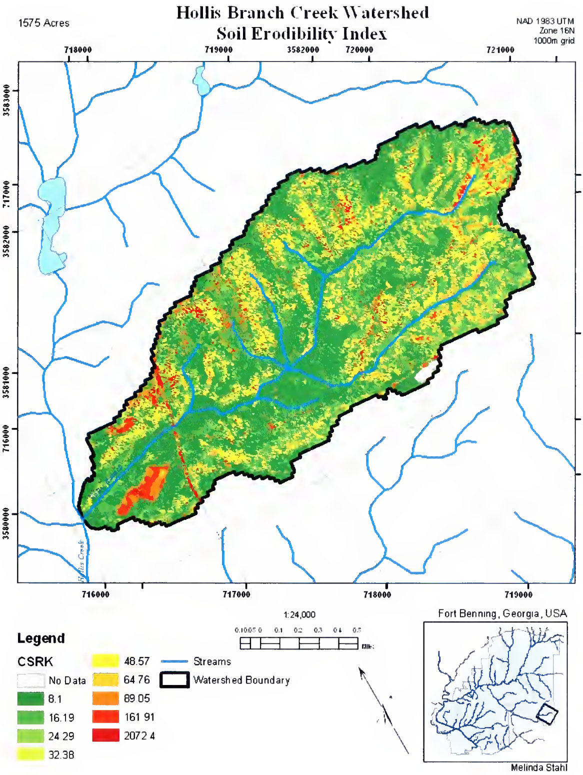
Hollis Branch Creek Watershed
Soil Series Delineation Map

NAD 1983 UTM
Zone 16N
1000m grid

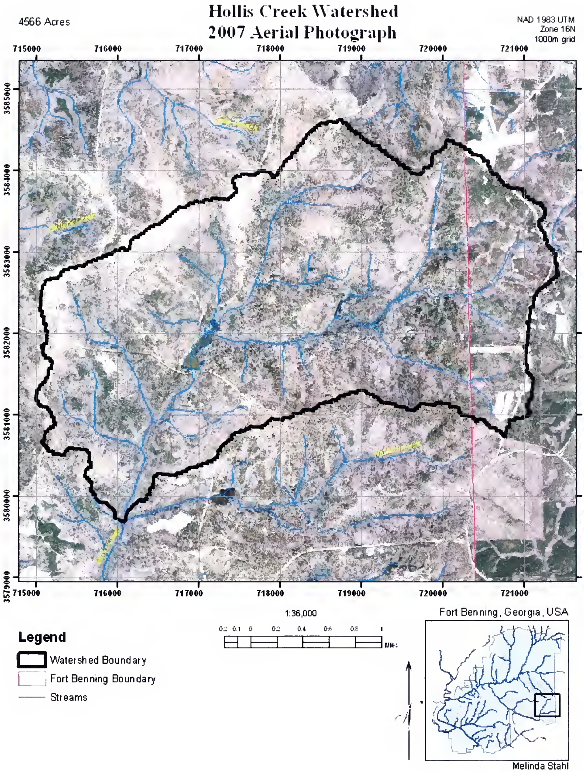


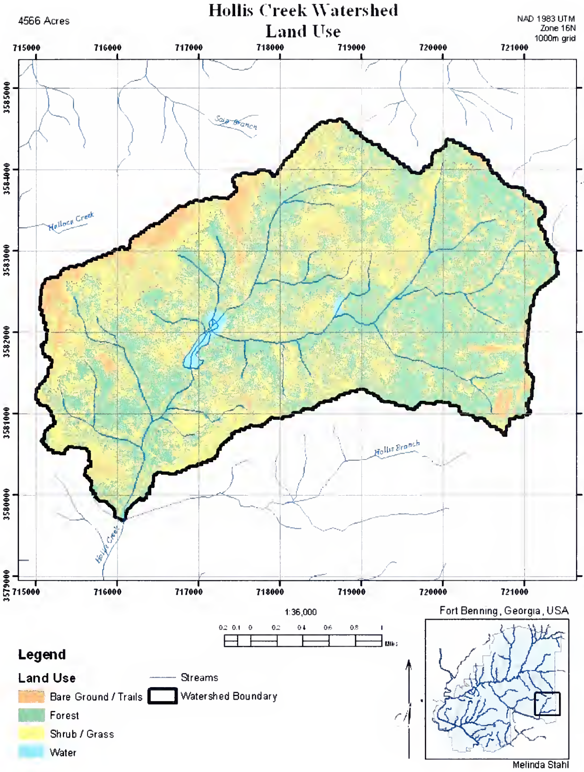
Melinda Stahl


Hollis Branch Creek Watershed
Soil Erodibility Values (K)
1575 Acres
NAD 1983 UTM
Zone 16N
1000m grid
1:24,000
Fort Benning, Georgia, USA
Legend
K Value
No Data
0.10
0.15
0.20
0.28
0.32
Streams
Watershed Boundary
Melinda Stahl

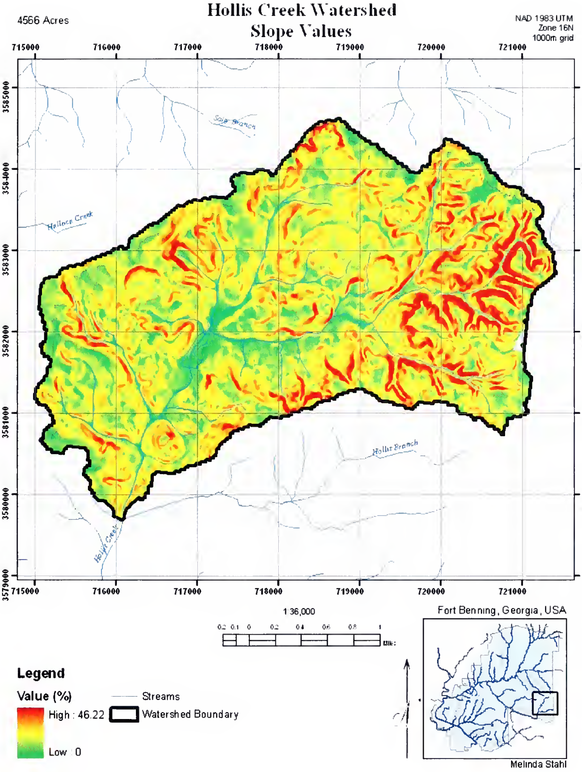

Hollis Branch Creek Watershed
Soil Erodibility Index
1575 Acres
NAD 1983 UTM
Zone 16N
1000m grid
Legend
CSRK
No Data
8.1
16.19
24.29
32.38
48.57
64.76
89.05
161.91
2072.4
Streams
Watershed Boundary
1:24,000
Fort Benning, Georgia, USA
Melinda Stahl

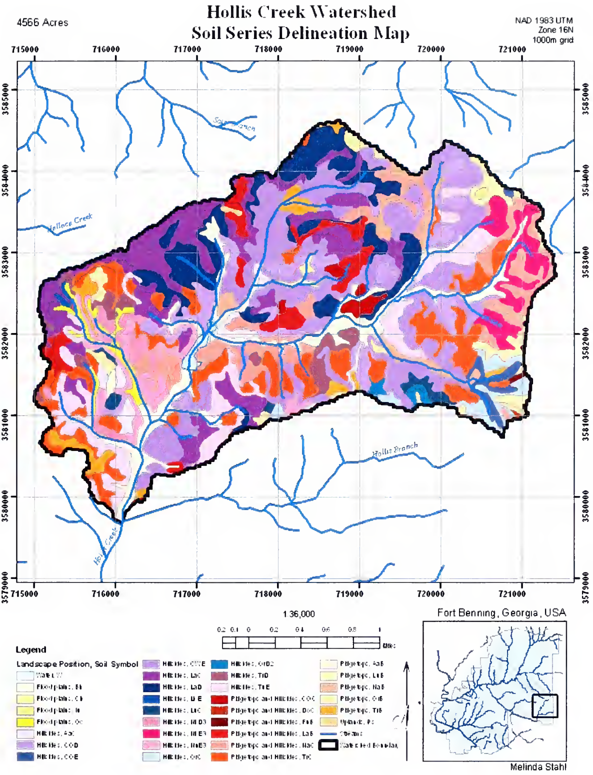
Hollis Creek Watershed Maps

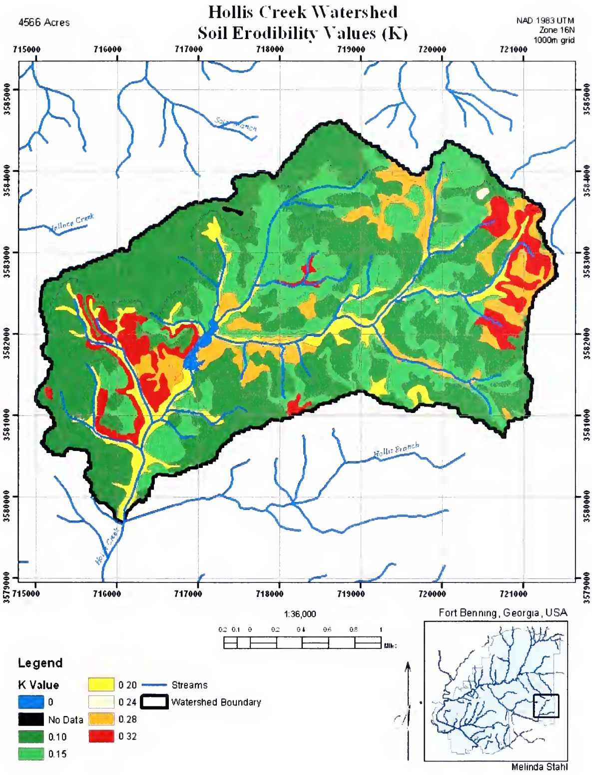

Hollis Creek Watershed
2007 Aerial Photograph
4566 Acres
NAD 1983 UTM
Zone 16N
1000m grid
715000
716000
717000
718000
719000
720000
721000
3585000
3584000
3583000
3582000
3581000
3580000
3579000
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Legend
Watershed Boundary
Fort Benning Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl



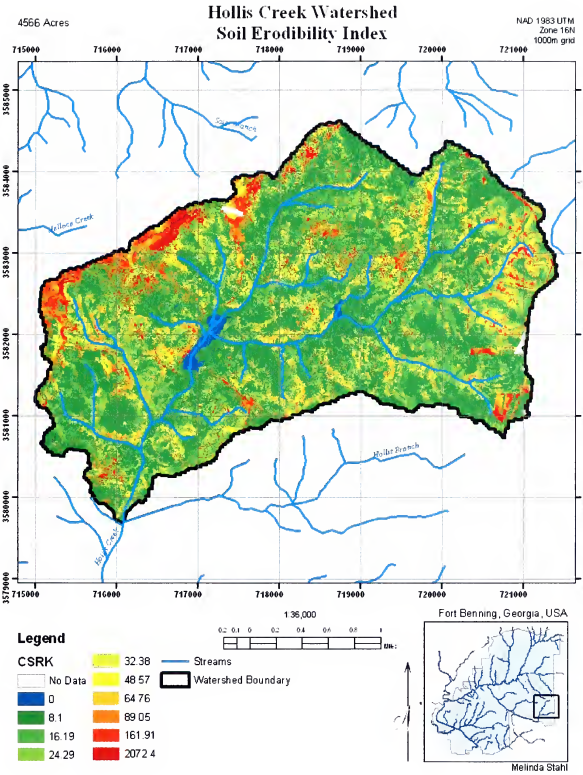
Hollis Creek Watershed
Land Use
4566 Acres
NAD 1983 UTM
Zone 16N
1000m grid
715000
716000
717000
718000
719000
720000
721000
3585000
3584000
3583000
3582000
3581000
3580000
3579000
Soap Branch
Hollock Creek
Hollis Branch
Hollis Creek
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl


Hollis Creek Watershed
Slope Values
4566 Acres
NAD 1983 UTM
Zone 16N
1000m grid
715000
716000
717000
718000
719000
720000
721000
3585000
3584000
3583000
3582000
3581000
3580000
3579000
Sap Branch
Hollis Creek
Hollis Branch
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Fort Benning, Georgia, USA
Legend
Value (%)
High : 46.22
Low : 0
Streams
Watershed Boundary
Melinda Stahl


Hollis Creek Watershed
Soil Series Delineation Map
4566 Acres
NAD 1983 UTM
Zone 16N
1000m grid
715000
716000
717000
718000
719000
720000
721000
3585000
3584000
3583000
3582000
3581000
3580000
3579000
Hollis Branch
Hollis Creek
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Legend
Landscape Position, Soil Symbol
Fort Benning, Georgia, USA
Melinda Stahl

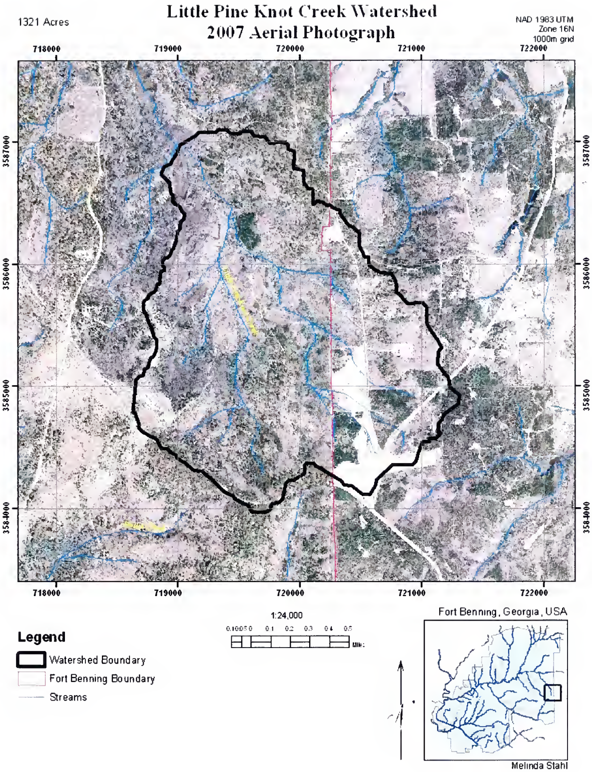


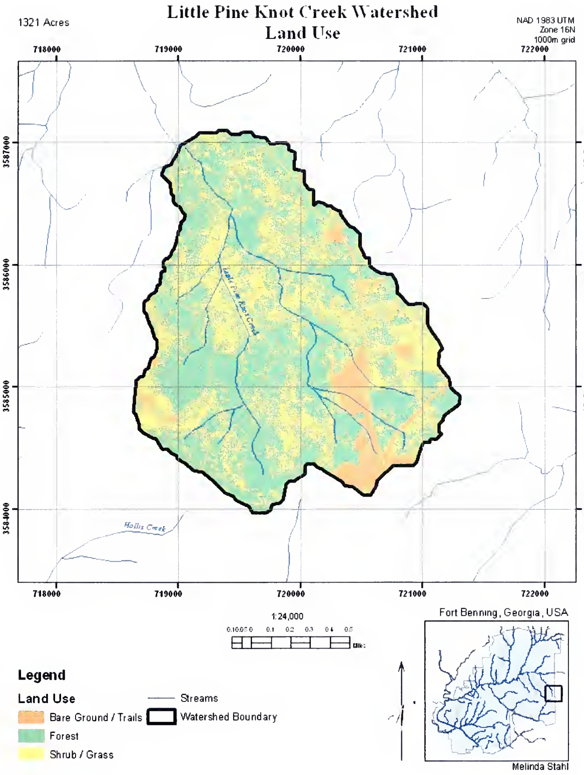
Hollis Creek Watershed
Soil Erodibility Values (K)
4566 Acres
NAD 1983 UTM
Zone 16N
1000m grid
715000
716000
717000
718000
719000
720000
721000
3585000
3584000
3583000
3582000
3581000
3580000
3579000
Hollis Branch
1:36,000
Fort Benning, Georgia, USA
Legend
K Value
0
No Data
0.10
0.15
0 20
0 24
0.28
0 32
Streams
Watershed Boundary
Melinda Stahl



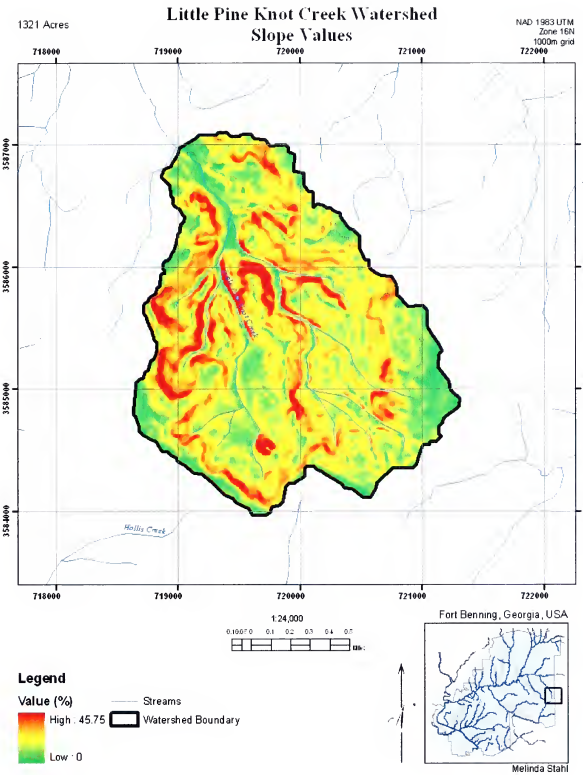
Hollis Creek Watershed
Soil Erodibility Index
4566 Acres
NAD 1983 UTM
Zone 16N
1000m grid
715000
716000
717000
718000
719000
720000
721000
3585000
3584000
3583000
3582000
3581000
3580000
3579000
Hollis Branch
1:36,000
Legend
CSRK
No Data
0
8.1
16.19
24.29
32.38
48.57
64.76
89.05
161.91
2072.4
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

Little Pine Knot Creek Watershed Maps

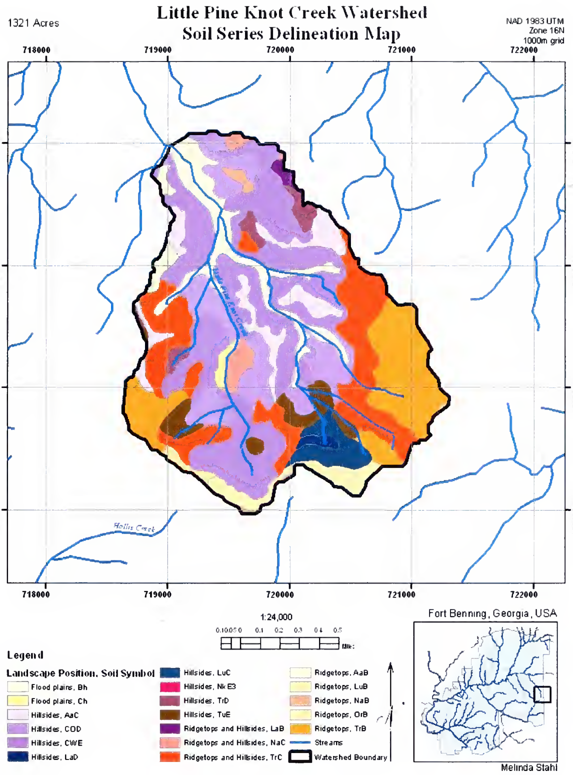

Little Pine Knot Creek Watershed
2007 Aerial Photograph
1321 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
720000
721000
722000
3587000
3586000
3585000
3584000
1:24,000
Miles
Legend
Watershed Boundary
Fort Benning Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl

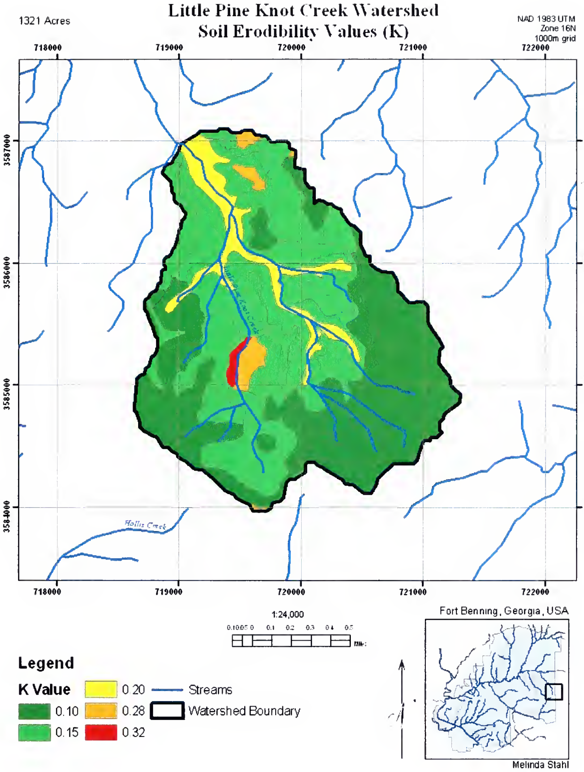


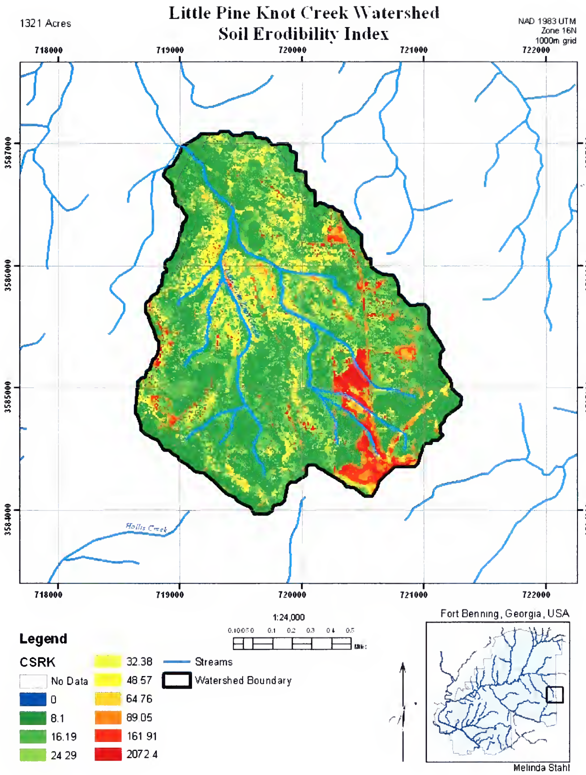
Little Pine Knot Creek Watershed
Land Use
1321 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
720000
721000
722000
3587000
3586000
3585000
3584000
Hollis Creek
1:24,000
Fort Benning, Georgia, USA
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Streams
Watershed Boundary
Melinda Stahl



Little Pine Knot Creek Watershed
Slope Values
1321 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
720000
721000
722000
3587000
3586000
3585000
3584000
Hollis Creek
1:24,000
Fort Benning, Georgia, USA
Legend
Value (%)
High : 45.75
Low : 0
Streams
Watershed Boundary
Melinda Stahl


Little Pine Knot Creek Watershed
Soil Series Delineation Map
1321 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
720000
721000
722000
3587000
3586000
3585000
3584000
Hollis Creek
Little Pine Knot Creek
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Miles
Fort Benning, Georgia, USA
Legend
Landscape Position, Soil Symbol
Flood plains, Bh
Flood plains, Ch
Hillsides, AaC
Hillsides, COD
Hillsides, CWE
Hillsides, LaD
Hillsides, LuC
Hillsides, NkE3
Hillsides, TrD
Hillsides, TuE
Ridgetops and Hillsides, LaB
Ridgetops and Hillsides, NaC
Ridgetops and Hillsides, TrC
Ridgetops, AaB
Ridgetops, LuB
Ridgetops, NaB
Ridgetops, OrB
Ridgetops, TrB
Streams
Watershed Boundary
Melinda Stahl


Little Pine Knot Creek Watershed
Soil Erodibility Values (K)
1321 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
720000
721000
722000
3587000
3586000
3585000
3584000
Hollis Creek
1:24,000
Miles
Legend
K Value
0.10
0.15
0.20
0.28
0.32
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl



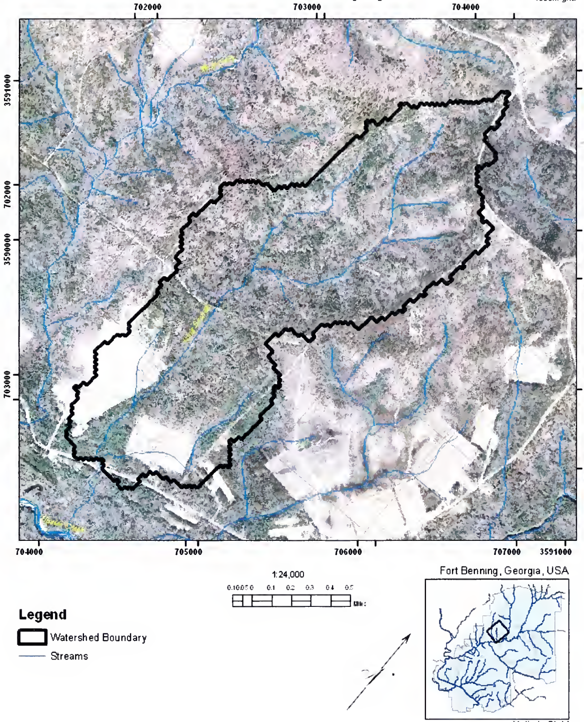
Little Pine Knot Creek Watershed
Soil Erodibility Index
1321 Acres
NAD 1983 UTM
Zone 16N
1000m grid
718000
719000
720000
721000
722000
3587000
3586000
3585000
3584000
Hollis Creek
1:24,000
Legend
CSRK
No Data
0
8.1
16.19
24 29
32.38
48 57
64 76
89 05
161 91
2072 4
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

Long Branch Creek Watershed Maps

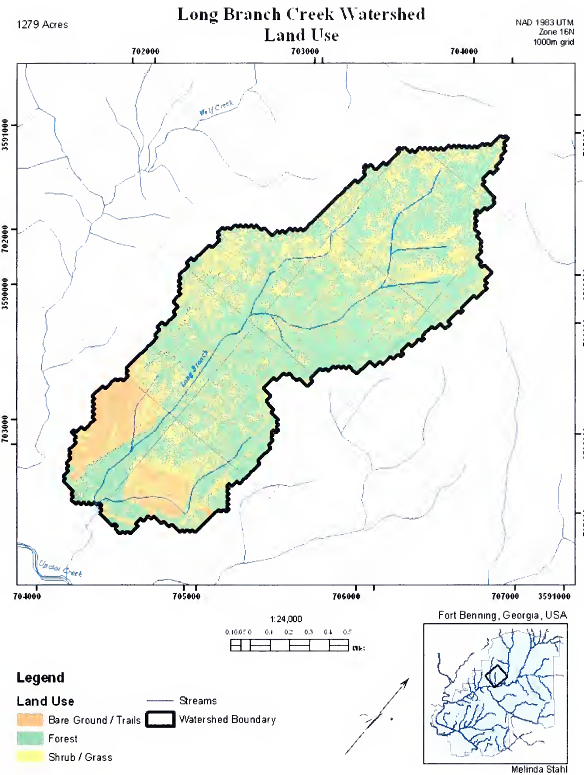
1279 Acres

Long Branch Creek Watershed
2007 Aerial Photograph

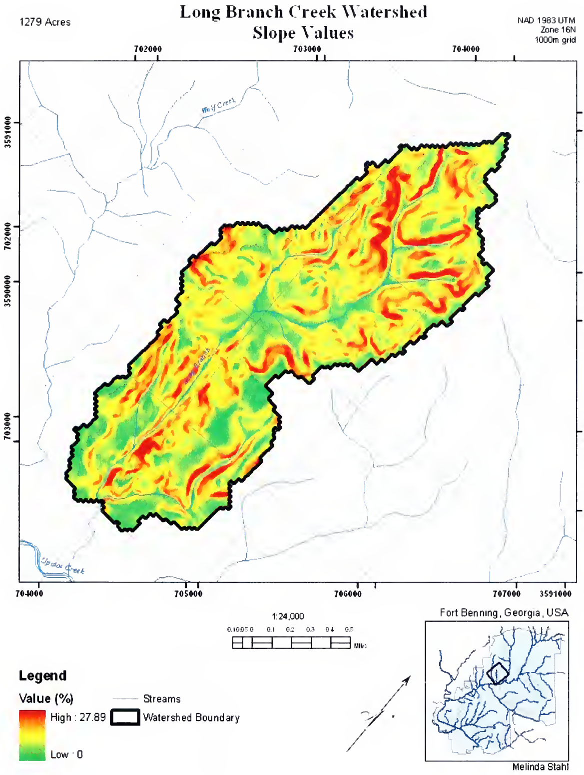
NAD 1983 UTM
Zone 16N
1000m grid



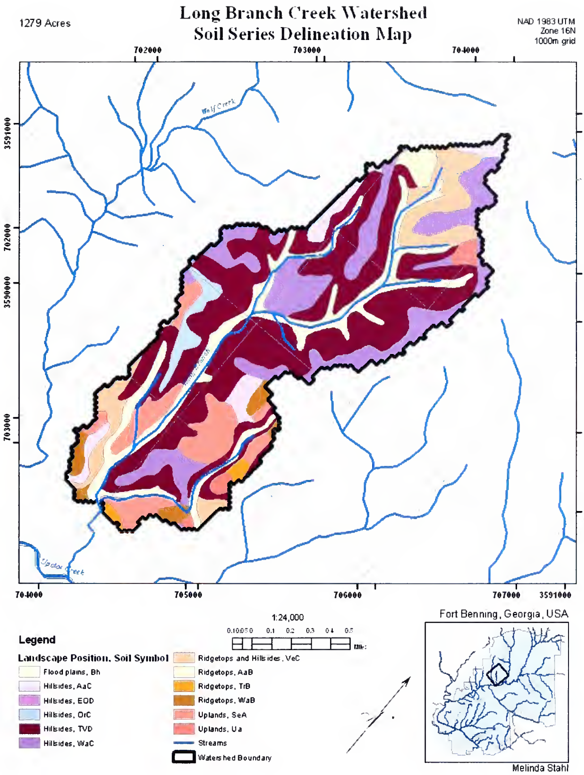
Melinda Stahl

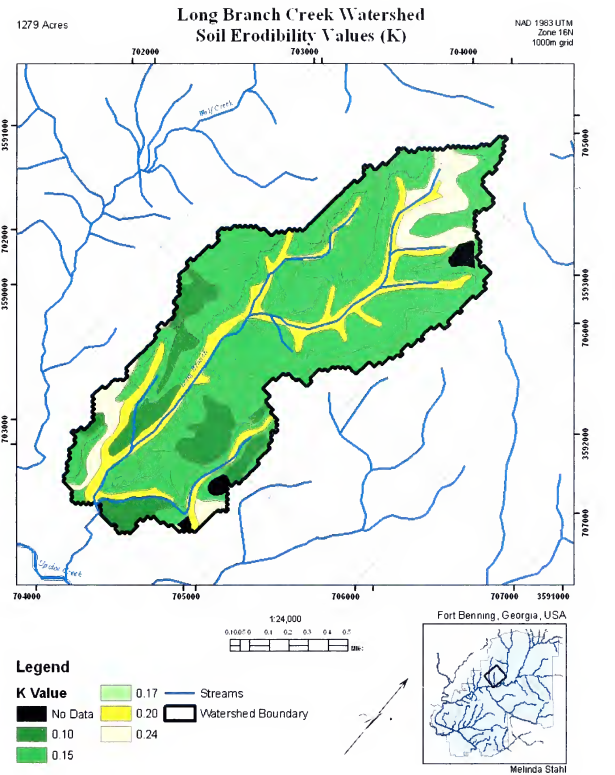


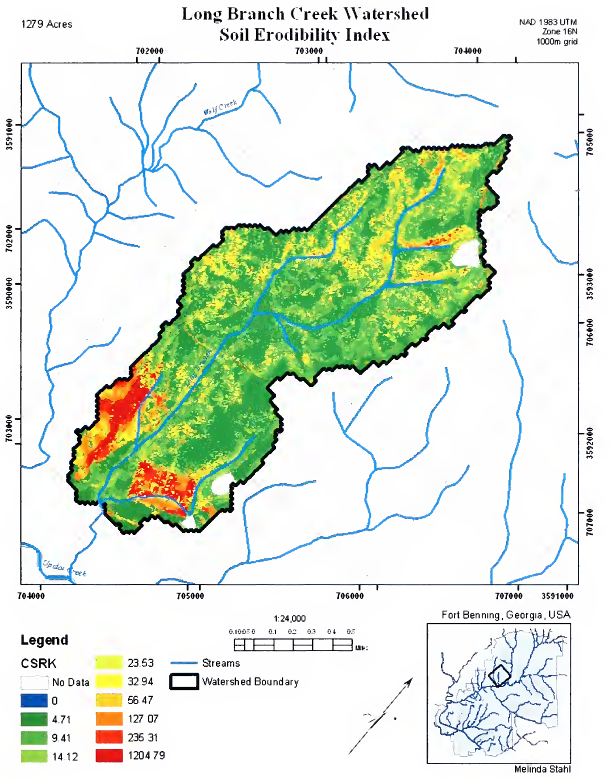
Long Branch Creek Watershed
Land Use
1279 Acres
NAD 1983 UTM
Zone 16N
1000m grid
702000
703000
704000
3591000
702000
3590000
703000
705000
3593000
706000
3592000
707000
704000
705000
706000
707000
3591000
Wolf Creek
Long Branch
1:24,000
Fort Benning, Georgia, USA
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Streams
Watershed Boundary
Melinda Stahl



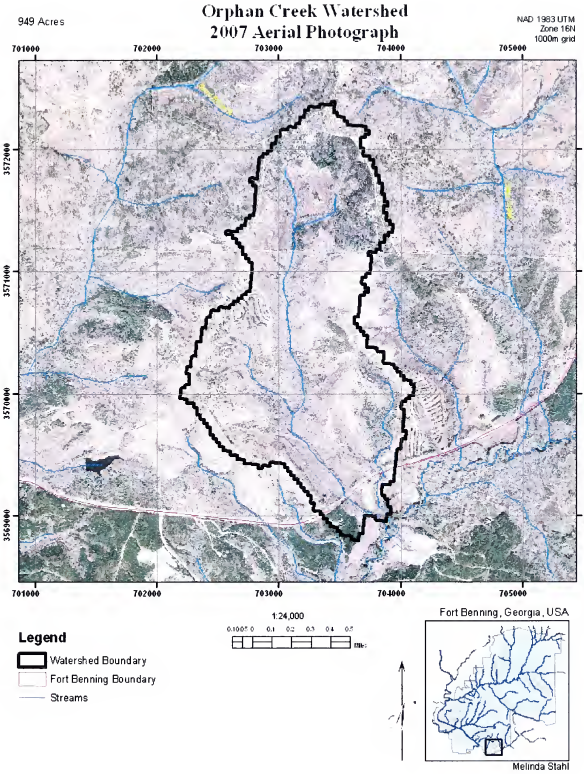
1279 Acres
Long Branch Creek Watershed
Slope Values
NAD 1983 UTM
Zone 16N
1000m grid
702000
703000
704000
3591000
702000
3590000
703000
705000
3593000
706000
3592000
707000
704000
705000
706000
707000
3591000
Wolf Creek
Upatoi Creek
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Miles
Fort Benning, Georgia, USA
Legend
Value (%)
High : 27.89
Low : 0
Streams
Watershed Boundary
Melinda Stahl


1279 Acres
Long Branch Creek Watershed
Soil Series Delineation Map
NAD 1983 UTM
Zone 16N
1000m grid
Wolf Creek
Upatoi Creek
1:24,000
Miles
Legend
Landscape Position, Soil Symbol
Flood plains, Bh
Hillsides, AaC
Hillsides, EOD
Hillsides, OrC
Hillsides, TVD
Hillsides, WaC
Ridgetops and Hillsides, VeC
Ridgetops, AaB
Ridgetops, TrB
Ridgetops, WaB
Uplands, SeA
Uplands, Ua
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

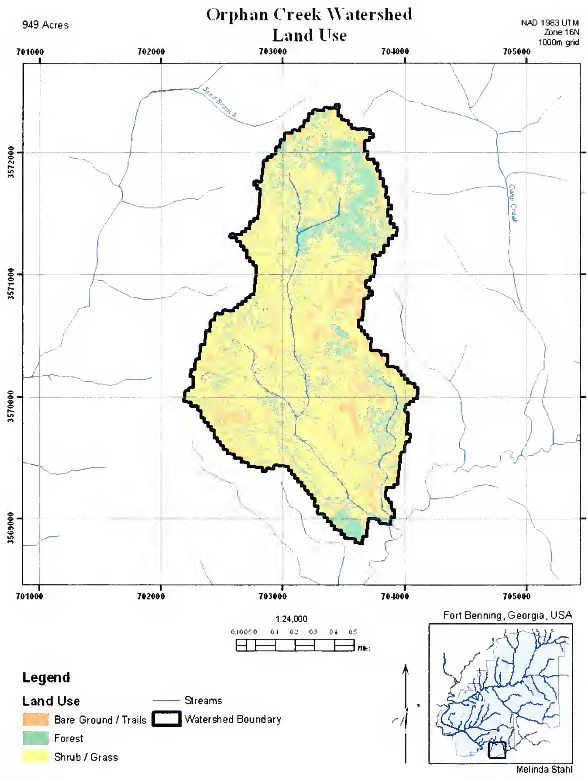

1279 Acres
Long Branch Creek Watershed
Soil Erodibility Values (K)
NAD 1983 UTM
Zone 16N
1000m grid
Wolf Creek
Long Branch
Upatoi Creek
1:24,000
Fort Benning, Georgia, USA
Legend
K Value
No Data
0.10
0.15
0.17
0.20
0.24
Streams
Watershed Boundary
Melinda Stahl

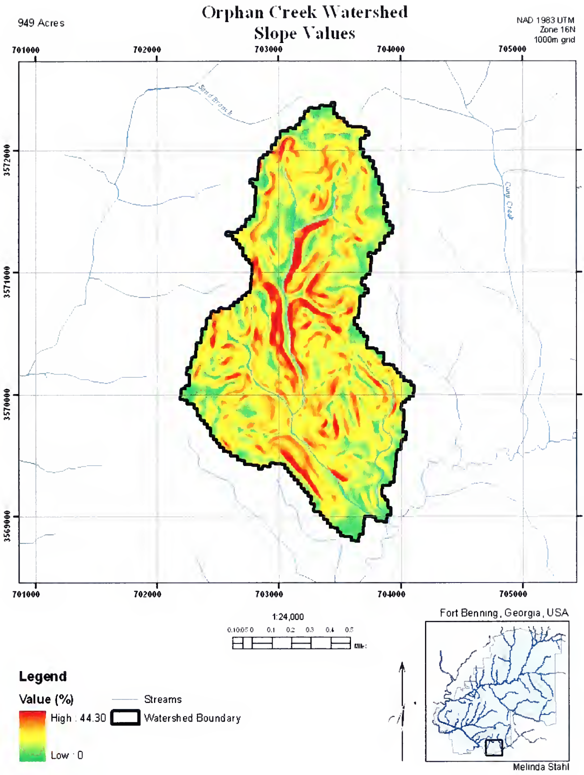

1279 Acres
Long Branch Creek Watershed
Soil Erodibility Index
NAD 1983 UTM
Zone 16N
1000m grid
702000
703000
704000
3591000
702000
3590000
703000
705000
3593000
706000
3592000
707000
704000
705000
706000
707000
3591000
Wolf Creek
Long Branch
1:24,000
Legend
CSRK
No Data
0
4.71
9.41
14.12
23.53
32.94
56.47
127.07
235.31
1204.79
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

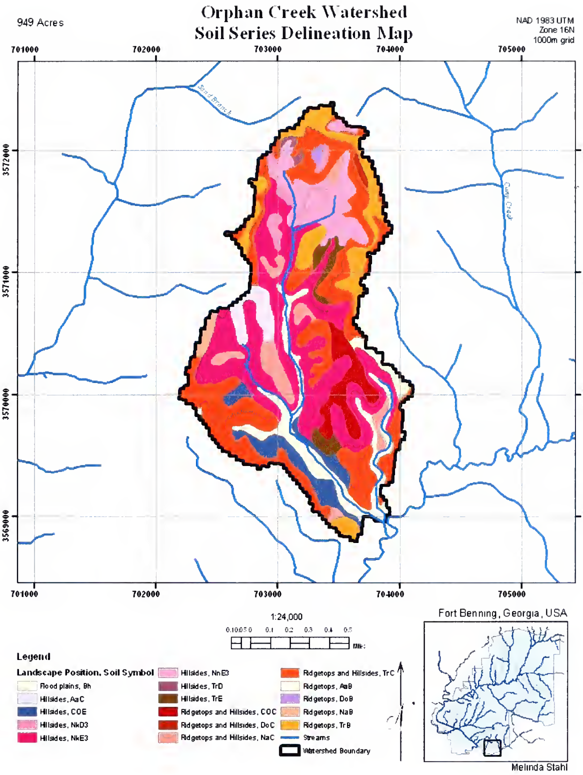
Orphan Creek Watershed Maps



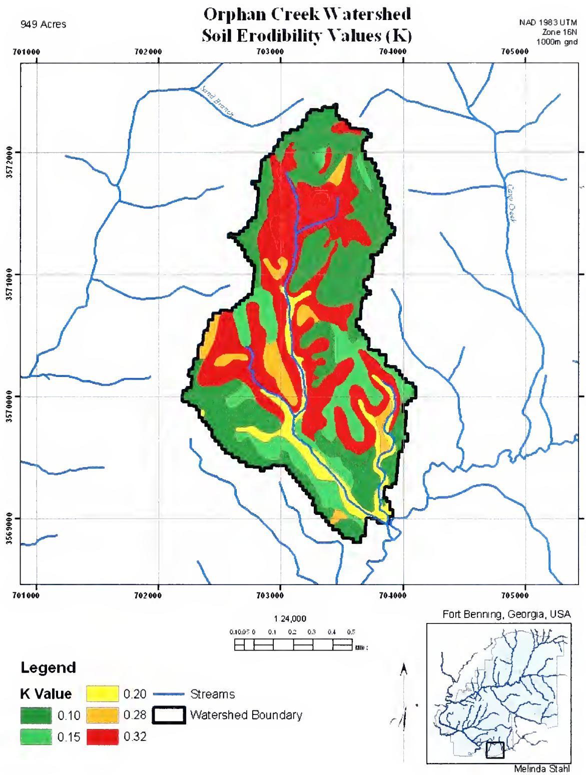
Orphan Creek Watershed
2007 Aerial Photograph
949 Acres
NAD 1983 UTM
Zone 16N
1000m grid
701000
702000
703000
704000
705000
3572000
3571000
3570000
3569000
1:24,000
Legend
Watershed Boundary
Fort Benning Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl


949 Acres
Orphan Creek Watershed
Land Use
NAD 1983 UTM
Zone 16N
1000m grid
701000
702000
703000
704000
705000
3572000
3571000
3570000
3569000
Sand Branch
1:24,000
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

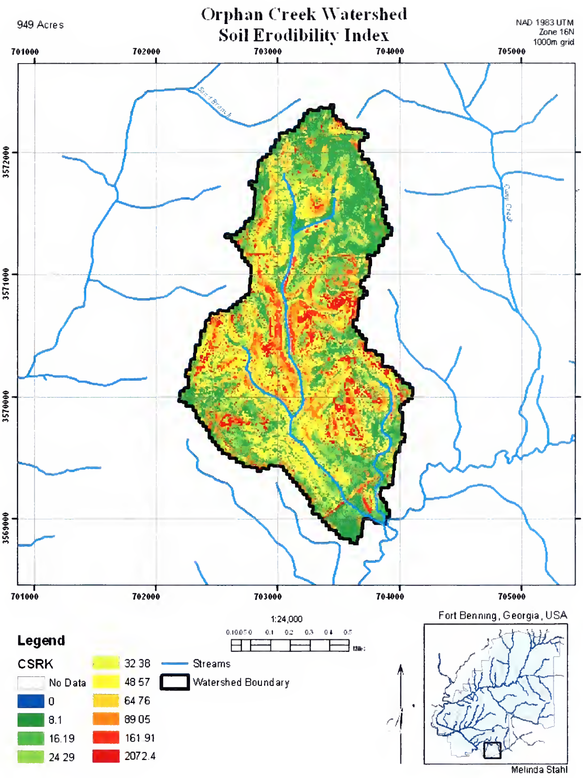

949 Acres
Orphan Creek Watershed
Slope Values
NAD 1983 UTM
Zone 16N
1000m grid
701000
702000
703000
704000
705000
3572000
3571000
3570000
3569000
Sand Branch
Camp Creek
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Fort Benning, Georgia, USA
Legend
Value (%)
High : 44.30
Low : 0
Streams
Watershed Boundary
Melinda Stahl



Orphan Creek Watershed
Soil Series Delineation Map
949 Acres
NAD 1983 UTM
Zone 16N
1000m grid
701000
702000
703000
704000
705000
3572000
3571000
3570000
3569000
1:24,000
Miles
Legend
Landscape Position, Soil Symbol
Flood plains, Bh
Hillsides, AaC
Hillsides, COE
Hillsides, NkD3
Hillsides, NkE3
Hillsides, NnE3
Hillsides, TrD
Hillsides, TrE
Ridgetops and Hillsides, COC
Ridgetops and Hillsides, DoC
Ridgetops and Hillsides, NaC
Ridgetops and Hillsides, TrC
Ridgetops, AaB
Ridgetops, DoB
Ridgetops, NaB
Ridgetops, TrB
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

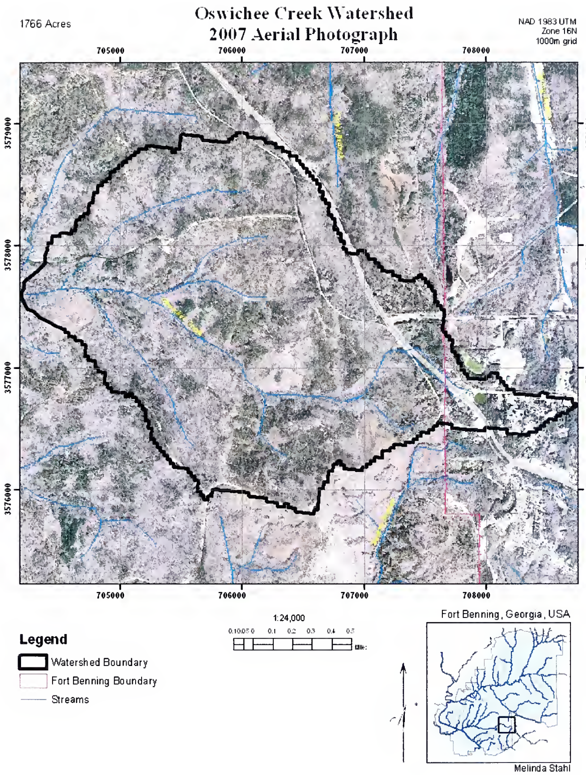


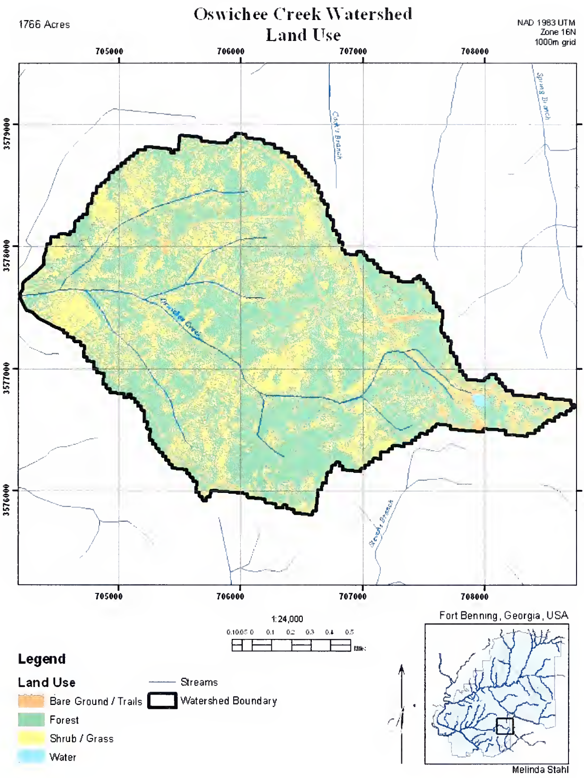
949 Acres
Orphan Creek Watershed
Soil Erodibility Values (K)
NAD 1983 UTM
Zone 16N
1000m grid
701000
702000
703000
704000
705000
3572000
3571000
3570000
3569000
Sand Branch
Camp Creek
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Miles
Legend
K Value
0.10
0.15
0.20
0.28
0.32
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

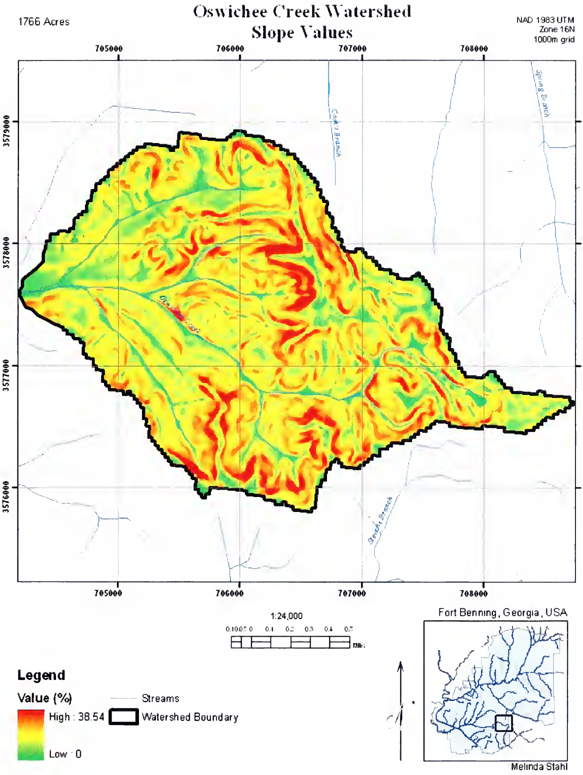


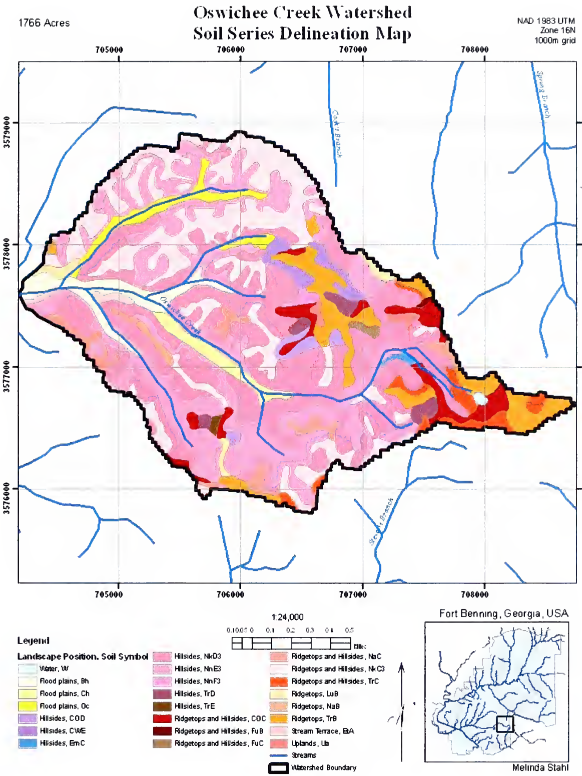
Orphan Creek Watershed
Soil Erodibility Index
949 Acres
NAD 1983 UTM
Zone 16N
1000m grid
701000
702000
703000
704000
705000
3572000
3571000
3570000
3569000
Sand Branch
Cuny Creek
1:24,000
Legend
CSRK
No Data
0
8.1
16.19
24 29
32 38
48 57
64 76
89 05
161 91
2072.4
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

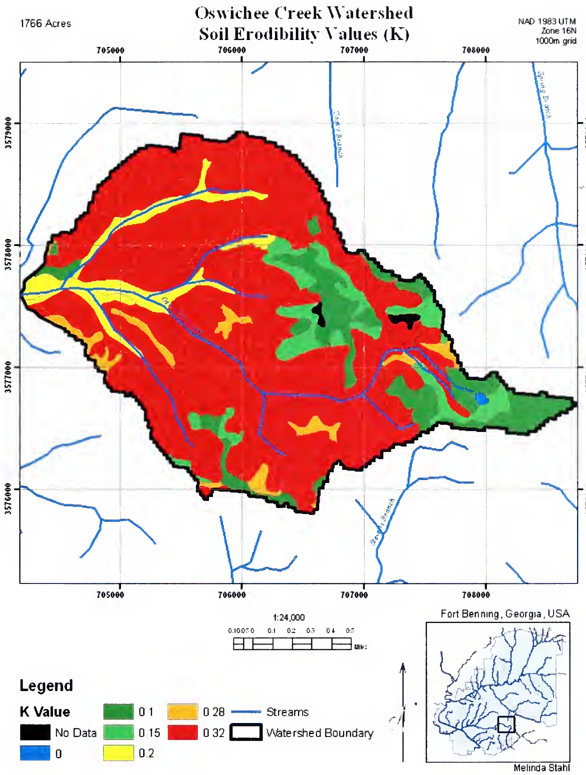
Oswichee Creek Watershed Maps

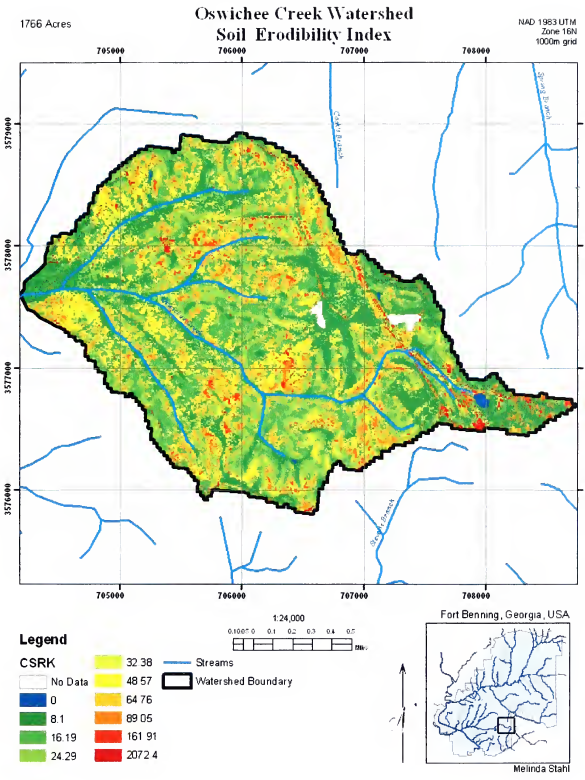

1766 Acres
Oswichee Creek Watershed
2007 Aerial Photograph
NAD 1983 UTM
Zone 16N
1000m grid
705000
706000
707000
708000
3579000
3578000
3577000
3576000
Legend
Watershed Boundary
Fort Benning Boundary
Streams
1:24,000
Fort Benning, Georgia, USA
Melinda Stahl


Oswichee Creek Watershed
Land Use
1766 Acres
NAD 1983 UTM
Zone 16N
1000m grid
705000
706000
707000
708000
3579000
3578000
3577000
3576000
Cook's Branch
Spring Branch
Oswichee Creek
Steven's Branch
1:24,000
Miles
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl


1766 Acres
Oswichee Creek Watershed
Slope Values
NAD 1983 UTM
Zone 16N
1000m grid
705000
706000
707000
708000
3579000
3578000
3577000
3576000
Cook's Branch
Spring Branch
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Miles
Fort Benning, Georgia, USA
Legend
Value (%)
High : 38.54
Low : 0
Streams
Watershed Boundary
Melinda Stahl

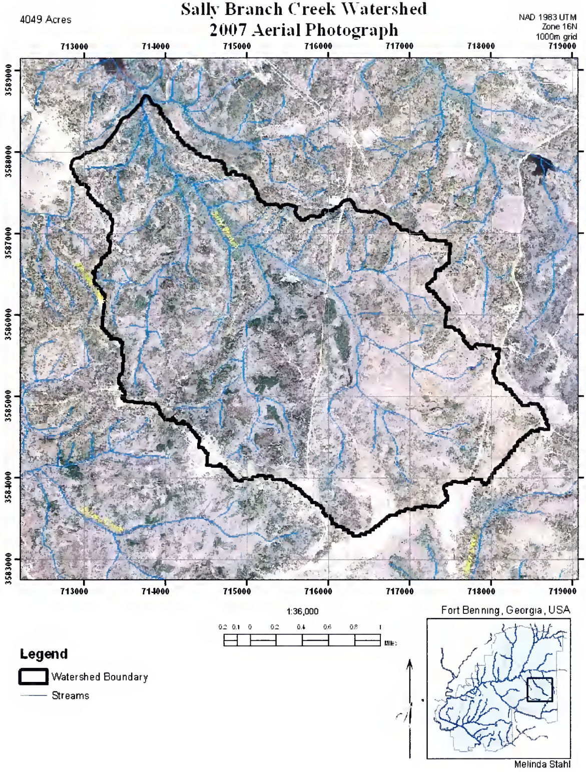

1766 Acres
Oswichee Creek Watershed
Soil Series Delineation Map
NAD 1983 UTM
Zone 16N
1000m grid
705000
706000
707000
708000
3579000
3578000
3577000
3576000
Oswichee Creek
Cook's Branch
Spring Branch
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Miles
Legend
Landscape Position, Soil Symbol
Water, W
Flood plains, Bh
Flood plains, Ch
Flood plains, Oc
Hillsides, COD
Hillsides, CWE
Hillsides, EmC
Hillsides, NkD3
Hillsides, NnE3
Hillsides, NnF3
Hillsides, TrD
Hillsides, TrE
Ridgetops and Hillsides, COC
Ridgetops and Hillsides, FuB
Ridgetops and Hillsides, FuC
Ridgetops and Hillsides, NaC
Ridgetops and Hillsides, NkC3
Ridgetops and Hillsides, TrC
Ridgetops, LuB
Ridgetops, NaB
Ridgetops, TrB
Stream Terrace, BtA
Uplands, Ua
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

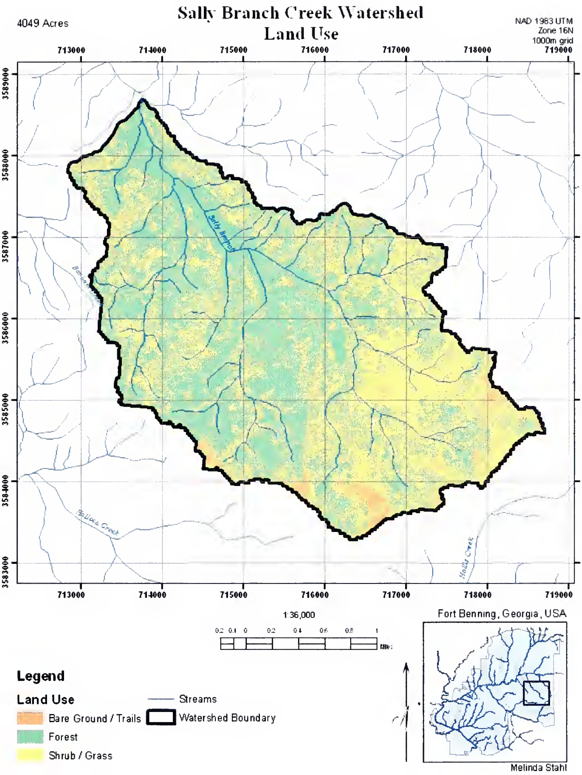

Oswichee Creek Watershed
Soil Erodibility Values (K)
1766 Acres
NAD 1983 UTM
Zone 16N
1000m grid
705000
706000
707000
708000
3579000
3578000
3577000
3576000
Spring Branch
1:24,000
Fort Benning, Georgia, USA
Legend
K Value
No Data
0
0.1
0.15
0.2
0.28
0.32
Streams
Watershed Boundary
Melinda Stahl

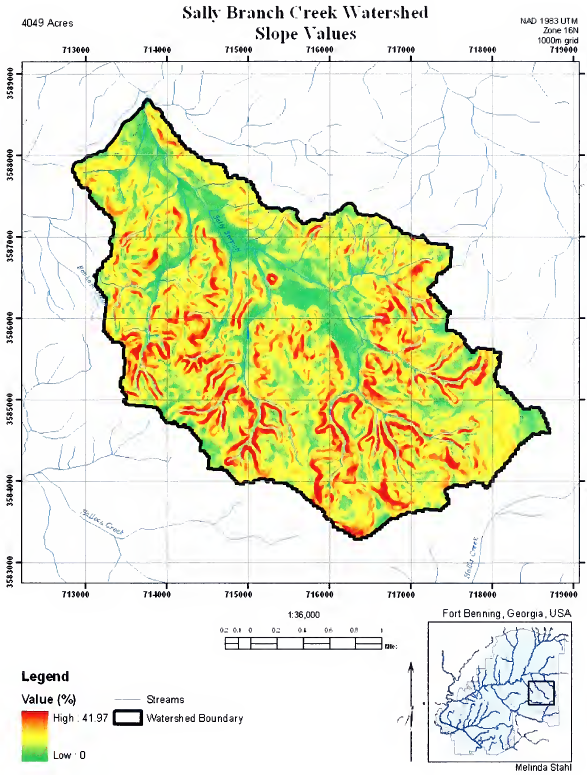

1766 Acres
Oswichee Creek Watershed
Soil Erodibility Index
NAD 1983 UTM
Zone 16N
1000m grid
705000
706000
707000
708000
3579000
3578000
3577000
3576000
Cook's Branch
Spring Branch
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Miles
Legend
CSRK
No Data
0
8.1
16.19
24.29
32 38
48 57
64 76
89 05
161 91
2072 4
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

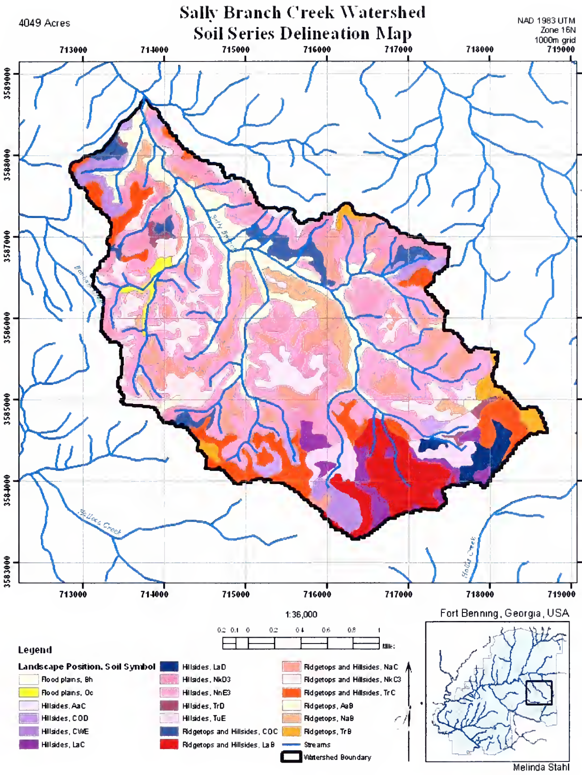
Sally Branch Creek Watershed Maps

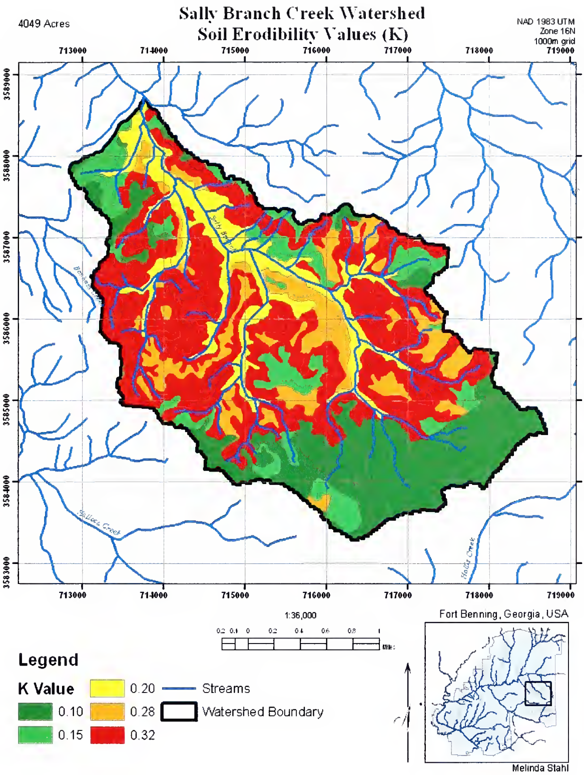
Sally Branch Creek Watershed
2007 Aerial Photograph

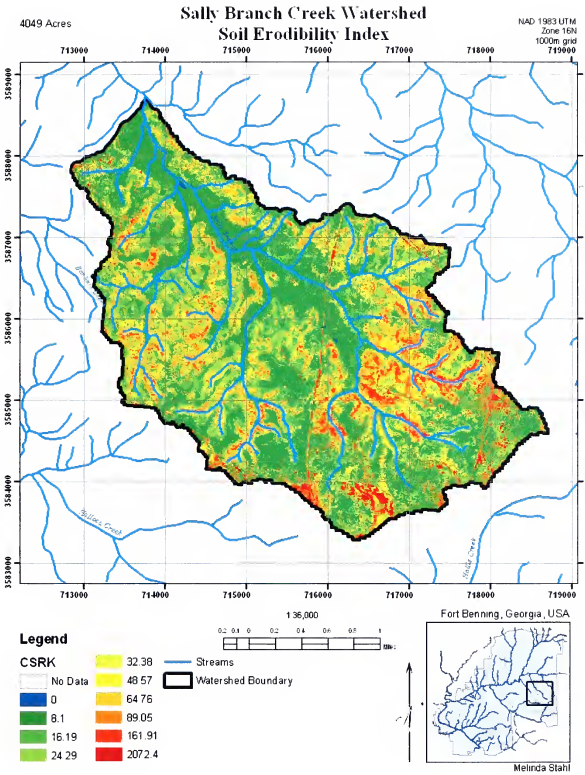



Sally Branch Creek Watershed
Land Use
4049 Acres
NAD 1983 UTM
Zone 16N
1000m grid
713000
714000
715000
716000
717000
718000
719000
3589000
3588000
3587000
3586000
3585000
3584000
3583000
Sally Branch
Holloca Creek
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Fort Benning, Georgia, USA
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Streams
Watershed Boundary
Melinda Stahl


Sally Branch Creek Watershed
Slope Values
4049 Acres
NAD 1983 UTM
Zone 16N
1000m grid
713000
714000
715000
716000
717000
718000
719000
3589000
3588000
3587000
3586000
3585000
3584000
3583000
1:36,000
Fort Benning, Georgia, USA
Legend
Value (%)
High : 41.97
Low : 0
Streams
Watershed Boundary
Melinda Stahl

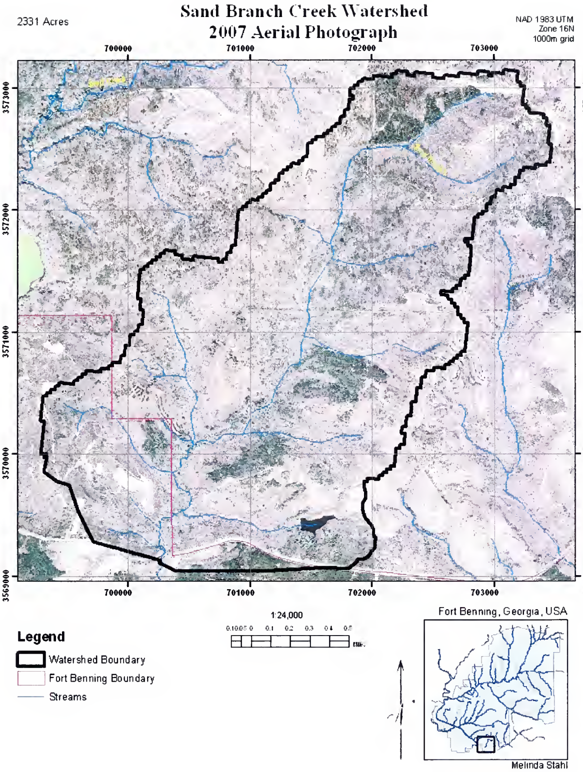

Sally Branch Creek Watershed
Soil Series Delineation Map
4049 Acres
NAD 1983 UTM
Zone 16N
1000m grid
713000
714000
715000
716000
717000
718000
719000
3589000
3588000
3587000
3586000
3585000
3584000
3583000
1:36,000
0.2 0.1 0 0.2 0.4 0.6 0.8 1
Miles
Fort Benning, Georgia, USA
Legend
Landscape Position, Soil Symbol
Flood plains, Bh
Flood plains, Oc
Hillsides, AaC
Hillsides, COD
Hillsides, CWE
Hillsides, LaC
Hillsides, LaD
Hillsides, NkD3
Hillsides, NnE3
Hillsides, TrD
Hillsides, TuE
Ridgetops and Hillsides, COC
Ridgetops and Hillsides, LaB
Ridgetops and Hillsides, NaC
Ridgetops and Hillsides, NkC3
Ridgetops and Hillsides, TrC
Ridgetops, AaB
Ridgetops, NaB
Ridgetops, TrB
Streams
Watershed Boundary
Melinda Stahl

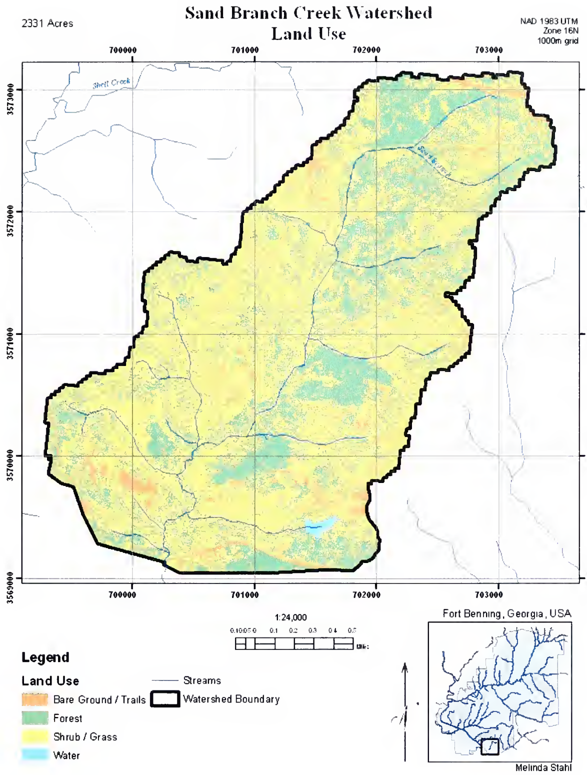

Sally Branch Creek Watershed
Soil Erodibility Values (K)
4049 Acres
NAD 1983 UTM
Zone 16N
1000m grid
713000
714000
715000
716000
717000
718000
719000
3589000
3588000
3587000
3586000
3585000
3584000
3583000
Sally Branch
Sally Creek
1:36,000
Fort Benning, Georgia, USA
Legend
K Value
0.10
0.15
0.20
0.28
0.32
Streams
Watershed Boundary
Melinda Stahl



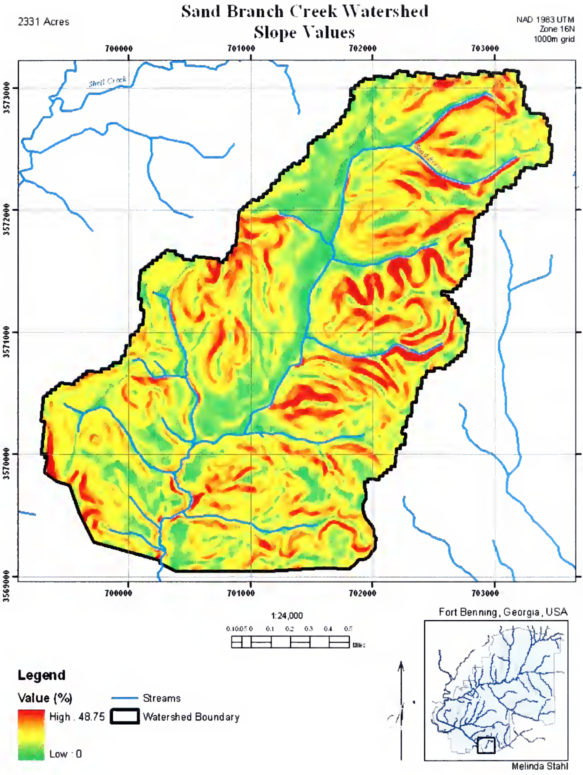
Sally Branch Creek Watershed
Soil Erodibility Index
4049 Acres
NAD 1983 UTM
Zone 16N
1000m grid
713000
714000
715000
716000
717000
718000
719000
3589000
3588000
3587000
3586000
3585000
3584000
3583000
1:36,000
Miles
Legend
CSRK
No Data
0
8.1
16.19
24.29
32.38
48.57
64.76
89.05
161.91
2072.4
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

Sand Branch Creek Watershed Maps


2331 Acres
Sand Branch Creek Watershed
2007 Aerial Photograph
NAD 1983 UTM
Zone 16N
1000m grid
700000
701000
702000
703000
3573000
3572000
3571000
3570000
3569000
1:24,000
0.1005 0 0.1 0.2 0.3 0.4 0.5
Legend
Watershed Boundary
Fort Benning Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl



2331 Acres
Sand Branch Creek Watershed
Land Use
NAD 1983 UTM
Zone 16N
1000m grid
700000
701000
702000
703000
3573000
3572000
3571000
3570000
3569000
Shell Creek
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Miles
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

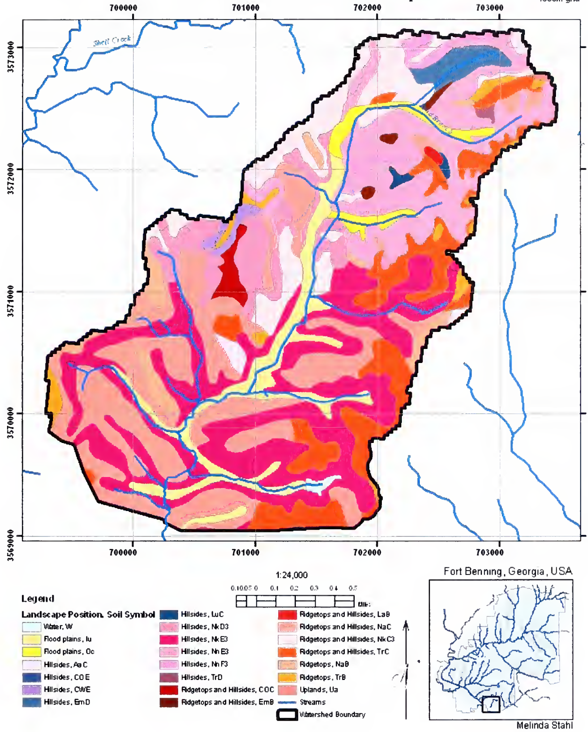


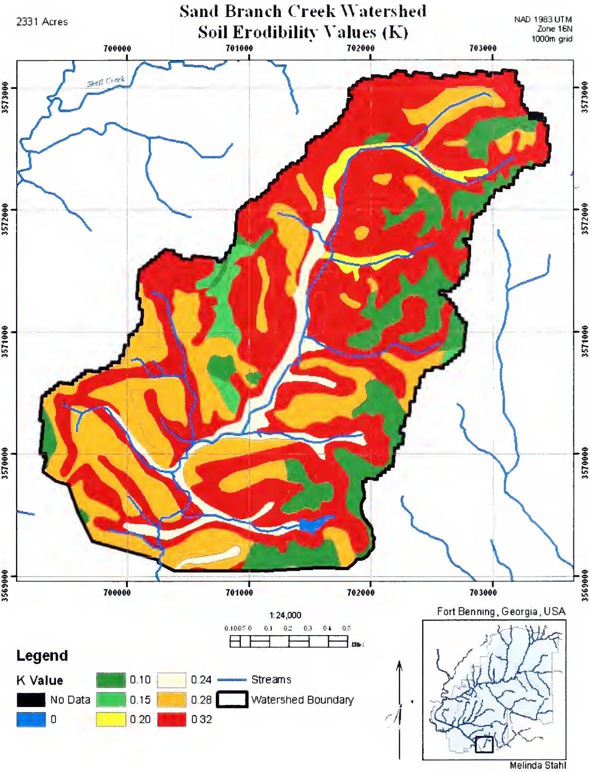
2331 Acres
Sand Branch Creek Watershed
Slope Values
NAD 1983 UTM
Zone 16N
1000m grid
700000
701000
702000
703000
3573000
3572000
3571000
3570000
3569000
Shell Creek
1:24,000
Miles
Fort Benning, Georgia, USA
Legend
Value (%)
High : 48.75
Low : 0
Streams
Watershed Boundary
Melinda Stahl

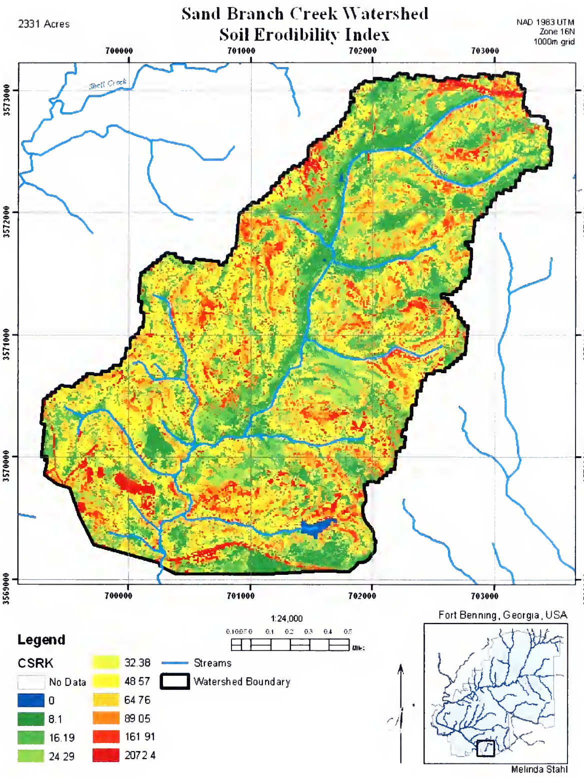
2331 Acres

Sand Branch Creek Watershed
Soil Series Delineation Map

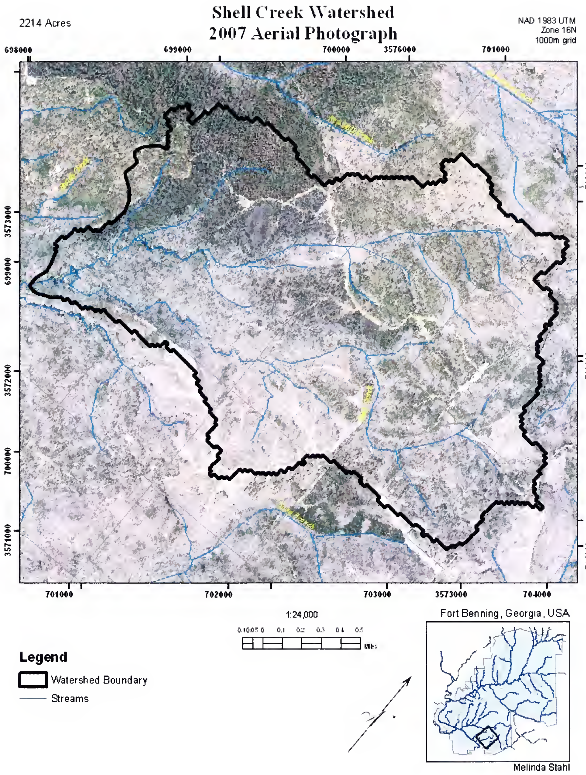
NAD 1983 UTM
Zone 16N
1000m grid



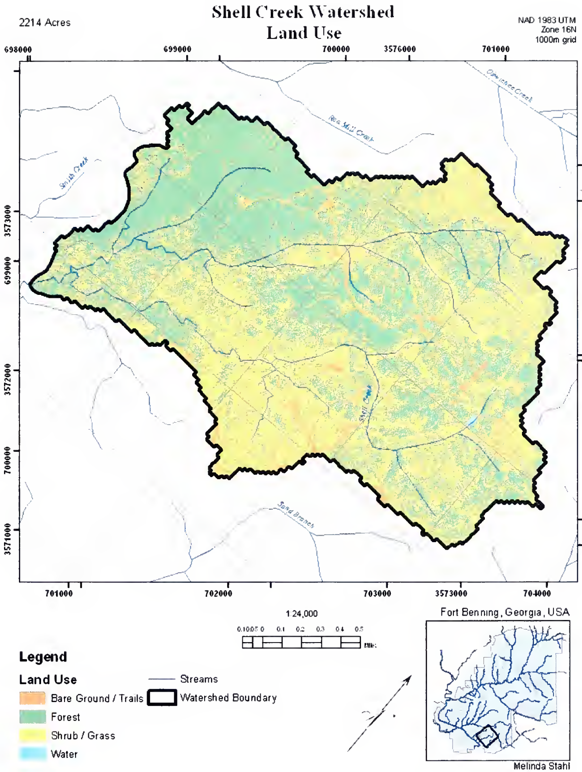

Sand Branch Creek Watershed
Soil Erodibility Values (K)
2331 Acres
NAD 1983 UTM
Zone 16N
1000m grid
700000
701000
702000
703000
3573000
3572000
3571000
3570000
3569000
Shell Creek
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Miles
Legend
K Value
No Data
0
0.10
0.15
0.20
0.24
0.28
0.32
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

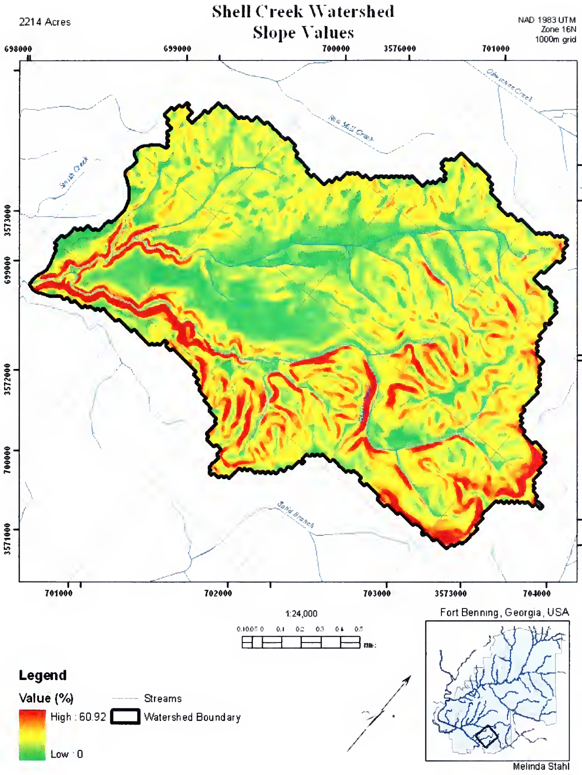

2331 Acres
Sand Branch Creek Watershed
Soil Erodibility Index
NAD 1983 UTM
Zone 16N
1000m grid
700000
701000
702000
703000
3573000
3572000
3571000
3570000
3569000
Shell Creek
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Miles
Fort Benning, Georgia, USA
Melinda Stahl
Legend
CSRK
No Data
0
8.1
16.19
24.29
32.38
48.57
64.76
89.05
161.91
2072.4
Streams
Watershed Boundary

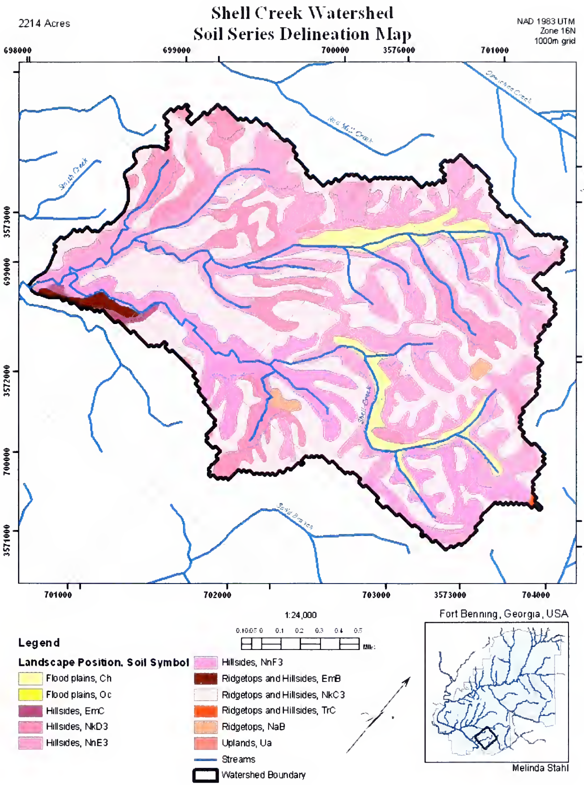
Shell Creek Watershed Maps



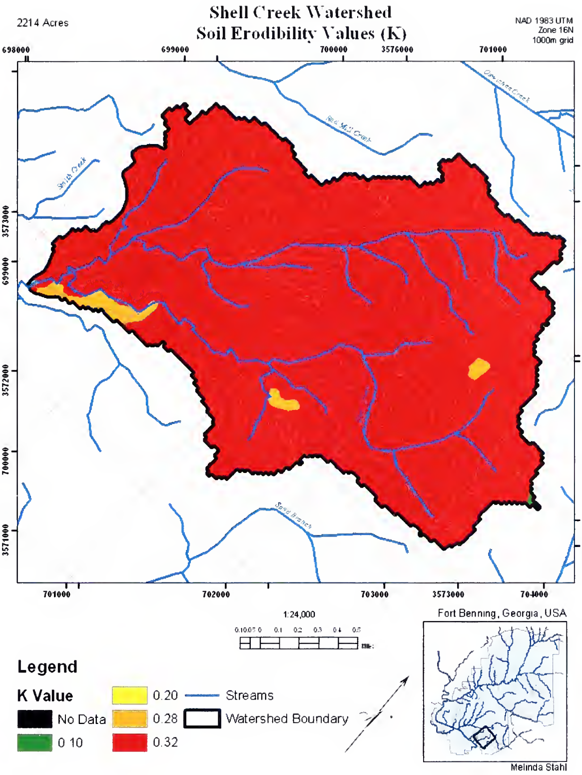
Shell Creek Watershed
2007 Aerial Photograph
2214 Acres
NAD 1983 UTM
Zone 16N
1000m grid
698000
699000
700000
3576000
701000
3573000
699000
3572000
700000
3571000
702000
703000
704000
701000
702000
703000
3573000
704000
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Miles
Legend
Watershed Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl


2214 Acres
Shell Creek Watershed
Land Use
NAD 1983 UTM
Zone 16N
1000m grid
Smith Creek
Red Mill Creek
Oswichee Creek
Shell Creek
Sand Branch
1:24,000
Miles
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

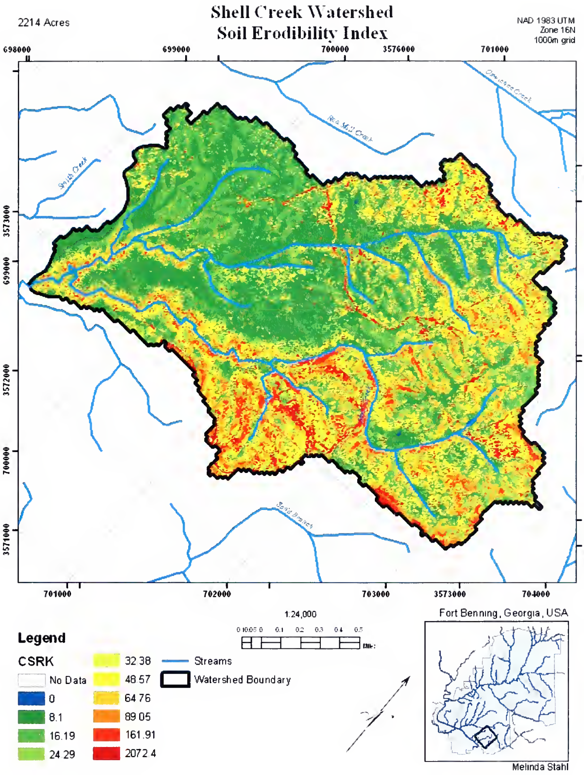

Shell Creek Watershed
Slope Values
2214 Acres
NAD 1983 UTM
Zone 16N
1000m grid
698000
699000
700000
3576000
701000
702000
703000
704000
3573000
3572000
3571000
Red Mill Creek
Smith Creek
Sand Branch
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Miles
Fort Benning, Georgia, USA
Legend
Value (%)
High : 60.92
Low : 0
Streams
Watershed Boundary
Melinda Stahl



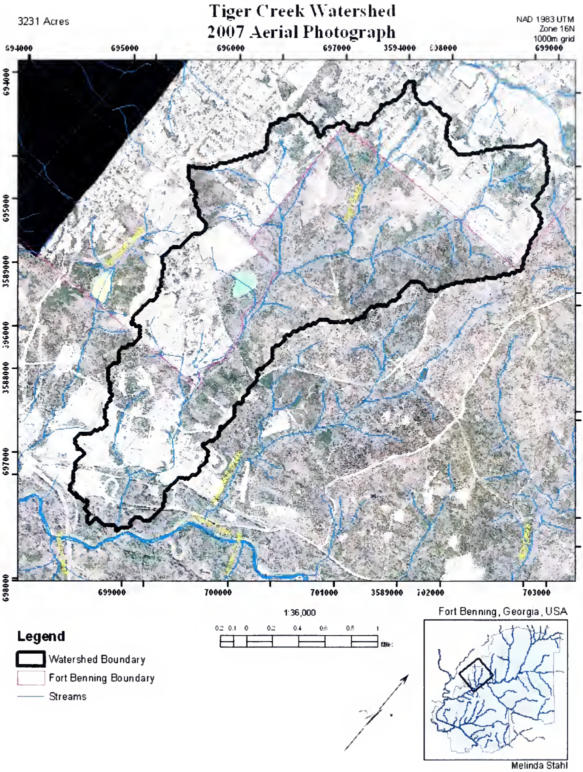
2214 Acres
Shell Creek Watershed
Soil Series Delineation Map
NAD 1983 UTM
Zone 16N
1000m grid
698000
699000
700000
3576000
701000
3573000
699000
3572000
700000
3571000
702000
703000
704000
701000
702000
703000
3573000
704000
Smith Creek
Red Mill Creek
Ochillee Creek
Shell Creek
Sand Branch
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Miles
Fort Benning, Georgia, USA
Legend
Landscape Position, Soil Symbol
Flood plains, Ch
Flood plains, Oc
Hillsides, EmC
Hillsides, NkD3
Hillsides, NnE3
Hillsides, NnF3
Ridgetops and Hillsides, EmB
Ridgetops and Hillsides, NkC3
Ridgetops and Hillsides, TrC
Ridgetops, NaB
Uplands, Ua
Streams
Watershed Boundary
Melinda Stahl

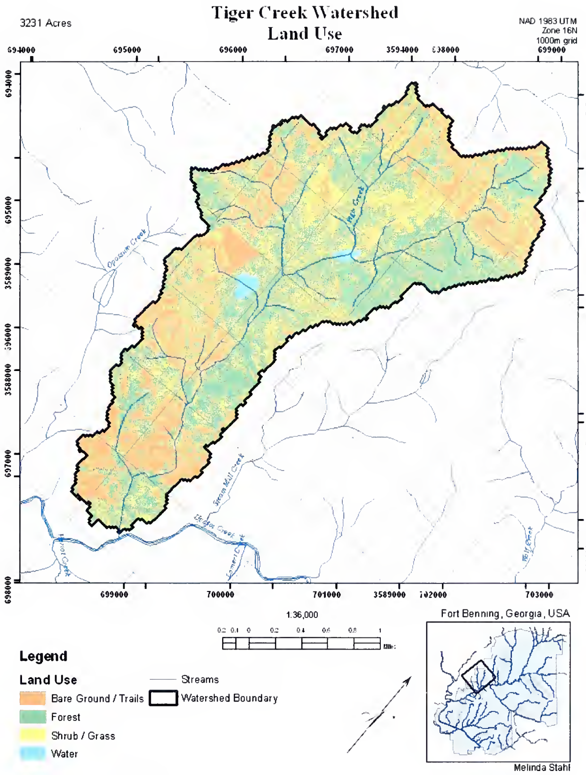


2214 Acres
Shell Creek Watershed
Soil Erodibility Values (K)
NAD 1983 UTM
Zone 16N
1000m grid
698000
699000
700000
3576000
701000
3573000
699000
3572000
700000
3571000
702000
703000
704000
701000
702000
703000
3573000
704000
Smith Creek
Red Mill Creek
Sand Branch
1:24,000
Fort Benning, Georgia, USA
Legend
K Value
No Data
0.10
0.20
0.28
0.32
Streams
Watershed Boundary
Melinda Stahl

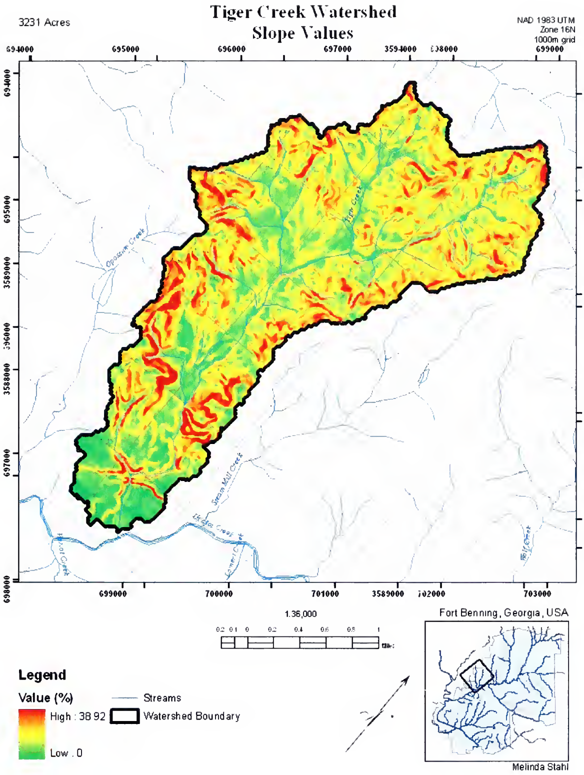

2214 Acres
Shell Creek Watershed
Soil Erodibility Index
NAD 1983 UTM
Zone 16N
1000m grid
698000
699000
700000
3576000
701000
702000
703000
704000
3573000
3572000
3571000
699000
700000
701000
702000
703000
3573000
704000
Smith Creek
Red Mill Creek
Sand Branch
1:24,000
0 0.05 0 0.1 0.2 0.3 0.4 0.5
Legend
CSRK
No Data
0
8.1
16.19
24.29
32.38
48.57
64.76
89.05
161.91
2072.4
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

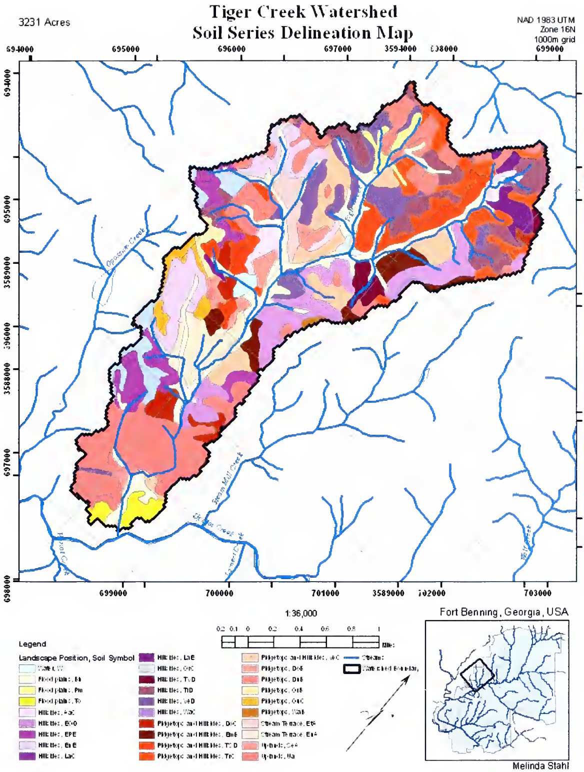
Tiger Creek Watershed Maps

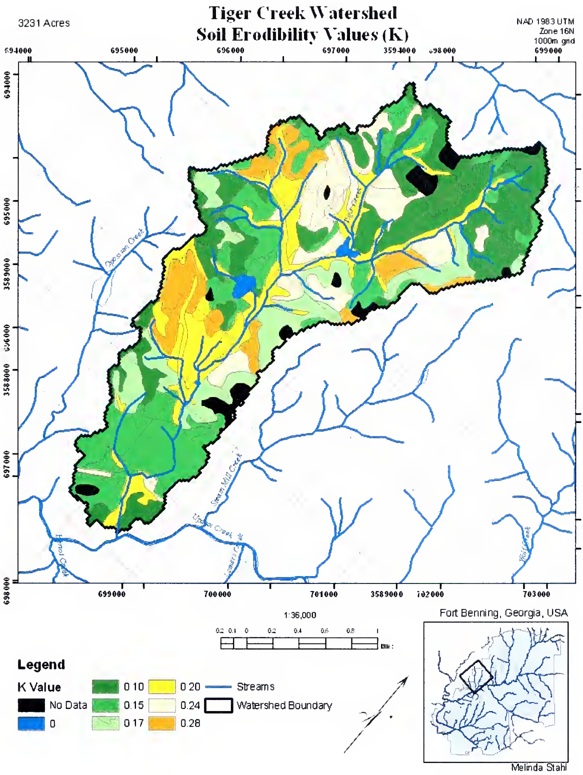

3231 Acres
Tiger Creek Watershed
2007 Aerial Photograph
NAD 1983 UTM
Zone 16N
1000m grid
1:36,000
Fort Benning, Georgia, USA
Legend
Watershed Boundary
Fort Benning Boundary
Streams
Melinda Stahl

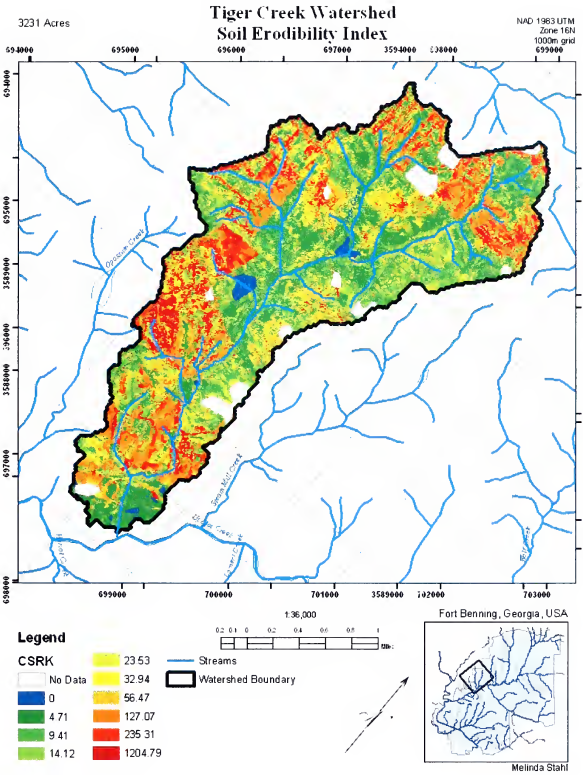


Tiger Creek Watershed
Land Use
3231 Acres
NAD 1983 UTM
Zone 16N
1000m grid
Opossum Creek
Steam Mill Creek
Fort Benning, Georgia, USA
1:36,000
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Melinda Stahl


3231 Acres
Tiger Creek Watershed
Slope Values
NAD 1983 UTM
Zone 16N
1000m grid
Opossum Creek
Tiger Creek
Steam Mill Creek
1:36,000
Fort Benning, Georgia, USA
Legend
Value (%)
High : 38.92
Low : 0
Streams
Watershed Boundary
Melinda Stahl

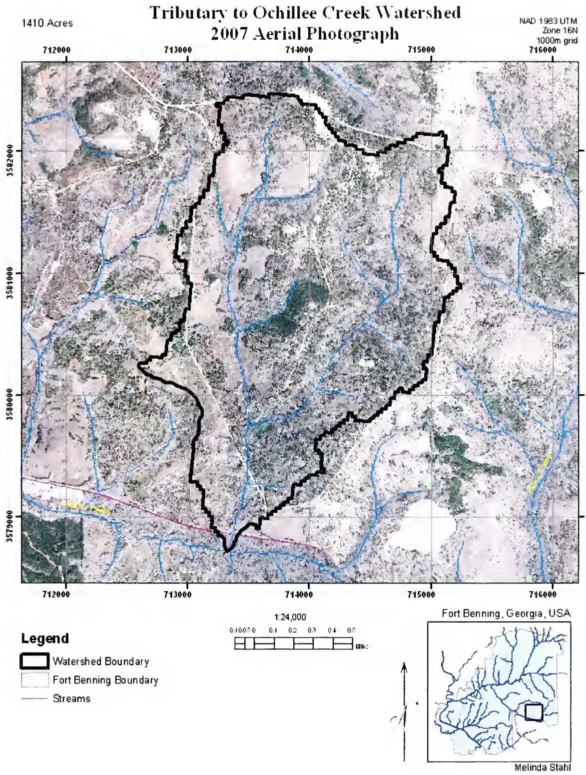

3231 Acres
Tiger Creek Watershed
Soil Series Delineation Map
NAD 1983 UTM
Zone 16N
1000m grid
Opossum Creek
Upatoi Creek
1:36,000
Legend
Landscape Position, Soil Symbol
Fort Benning, Georgia, USA
Melinda Stahl

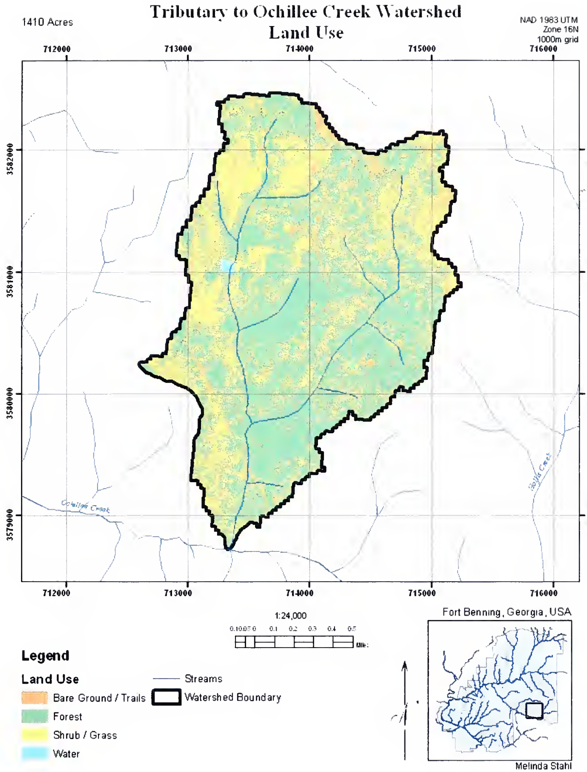

3231 Acres
Tiger Creek Watershed
Soil Erodibility Values (K)
NAD 1983 UTM
Zone 16N
1000m grid
1:36,000
Fort Benning, Georgia, USA
Legend
K Value
No Data
0
0.10
0.15
0.17
0.20
0.24
0.28
Streams
Watershed Boundary
Melinda Stahl

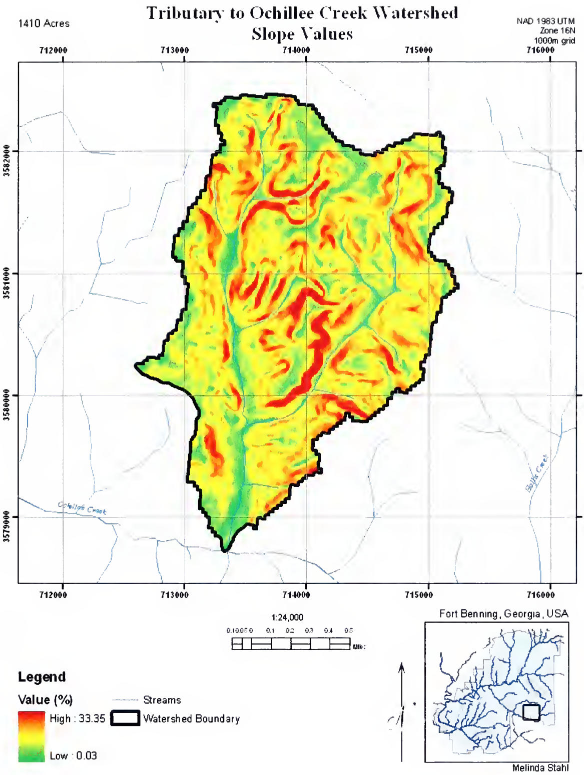


3231 Acres
Tiger Creek Watershed
Soil Erodibility Index
NAD 1983 UTM
Zone 16N
1000m grid
Opossum Creek
Legend
CSRK
No Data
0
4.71
9.41
14.12
23.53
32.94
56.47
127.07
235.31
1204.79
Streams
Watershed Boundary
1:36,000
Fort Benning, Georgia, USA
Melinda Stahl

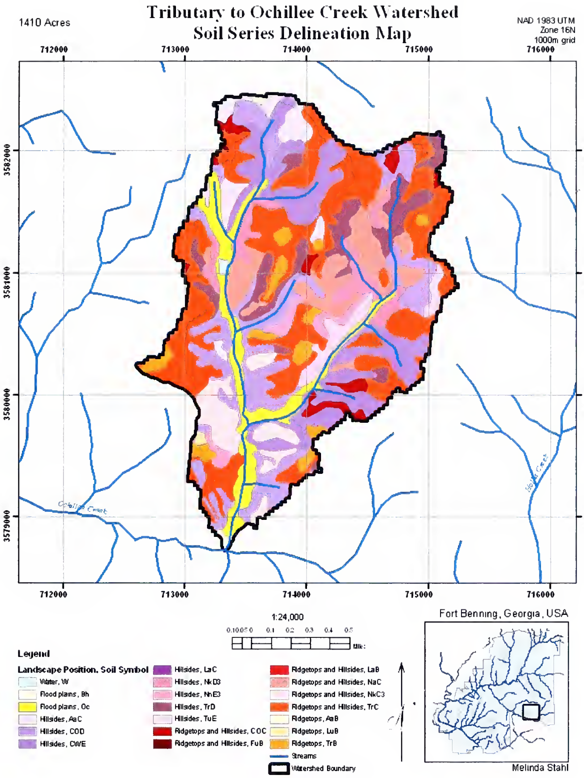
Unnamed Tributary to Ochillee Creek Watershed Maps

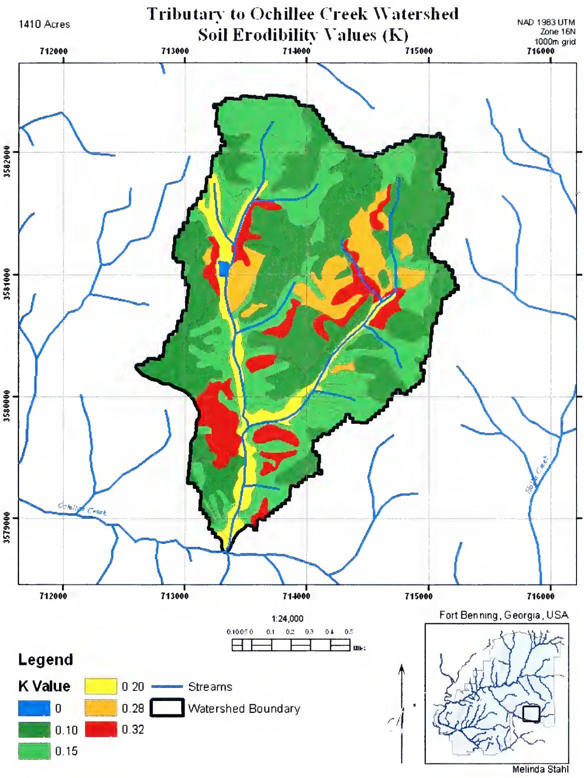

Tributary to Ochillee Creek Watershed
2007 Aerial Photograph
1410 Acres
NAD 1983 UTM
Zone 16N
1000m grid
712000
713000
714000
715000
716000
3582000
3581000
3580000
3579000
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Miles
Legend
Watershed Boundary
Fort Benning Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl

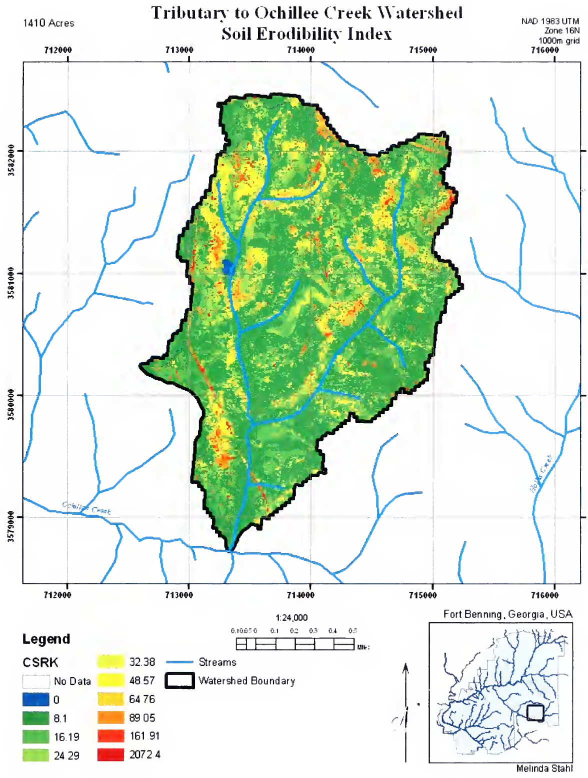

1410 Acres
Tributary to Ochillee Creek Watershed
Land Use
NAD 1983 UTM
Zone 16N
1000m grid
712000
713000
714000
715000
716000
3582000
3581000
3580000
3579000
Ochillee Creek
1:24,000
Miles
Fort Benning, Georgia, USA
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Melinda Stahl



1410 Acres
Tributary to Ochillee Creek Watershed
Slope Values
NAD 1983 UTM
Zone 16N
1000m grid
712000
713000
714000
715000
716000
3582000
3581000
3580000
3579000
Ochillee Creek
1:24,000
Fort Benning, Georgia, USA
Legend
Value (%)
High : 33.35
Low : 0.03
Streams
Watershed Boundary
Melinda Stahl

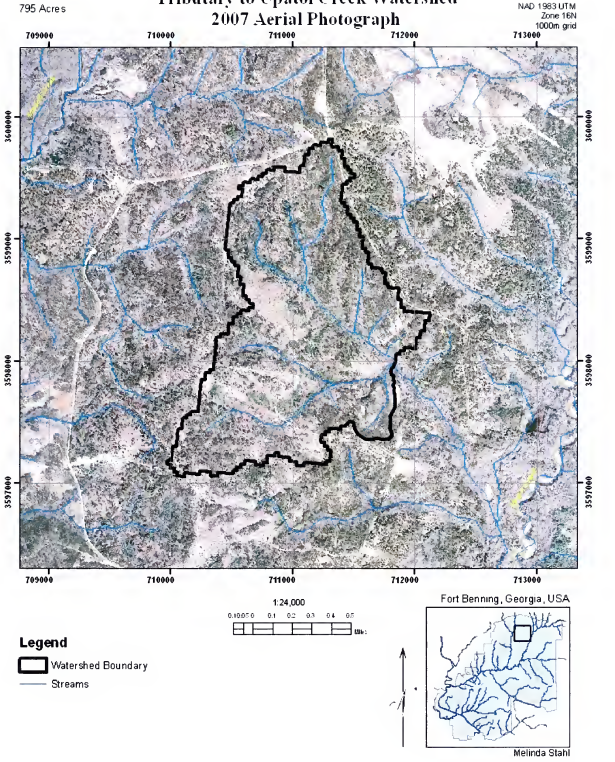

1410 Acres
Tributary to Ochillee Creek Watershed
Soil Series Delineation Map
NAD 1983 UTM
Zone 16N
1000m grid
712000
713000
714000
715000
716000
3582000
3581000
3580000
3579000
Ochillee Creek
1:24,000
0.1 0.05 0
0.1
0.2
0.3
0.4
0.5
Legend
Landscape Position, Soil Symbol
Water, W
Flood plains, Bh
Flood plains, Oc
Hillsides, AaC
Hillsides, COD
Hillsides, CWE
Hillsides, LaC
Hillsides, NkD3
Hillsides, NnE3
Hillsides, TrD
Hillsides, TuE
Ridgetops and Hillsides, COC
Ridgetops and Hillsides, FuB
Ridgetops and Hillsides, LaB
Ridgetops and Hillsides, NaC
Ridgetops and Hillsides, NkC3
Ridgetops and Hillsides, TrC
Ridgetops, AaB
Ridgetops, LuB
Ridgetops, TrB
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

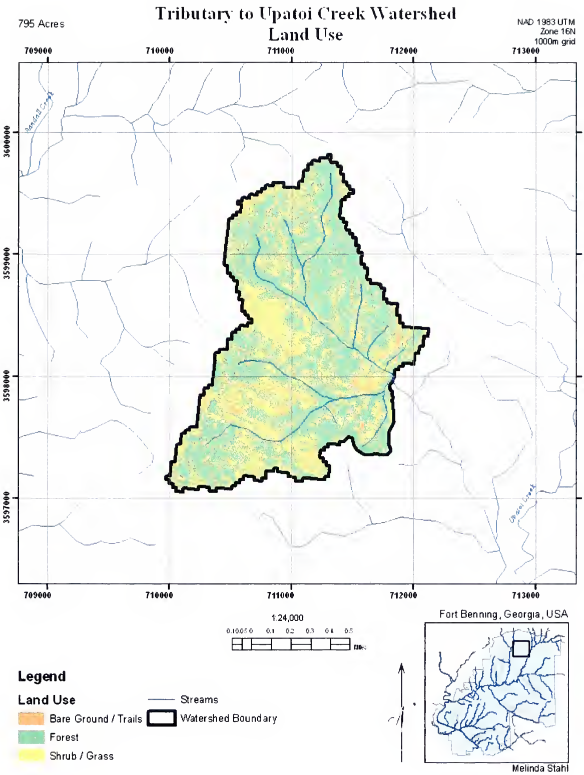

1410 Acres
Tributary to Ochillee Creek Watershed
Soil Erodibility Values (K)
NAD 1983 UTM
Zone 16N
1000m grid
712000
713000
714000
715000
716000
3582000
3581000
3580000
3579000
1:24,000
0.1 0.05 0 0.1 0.2 0.3 0.4 0.5
Legend
K Value
0
0.10
0.15
0.20
0.28
0.32
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

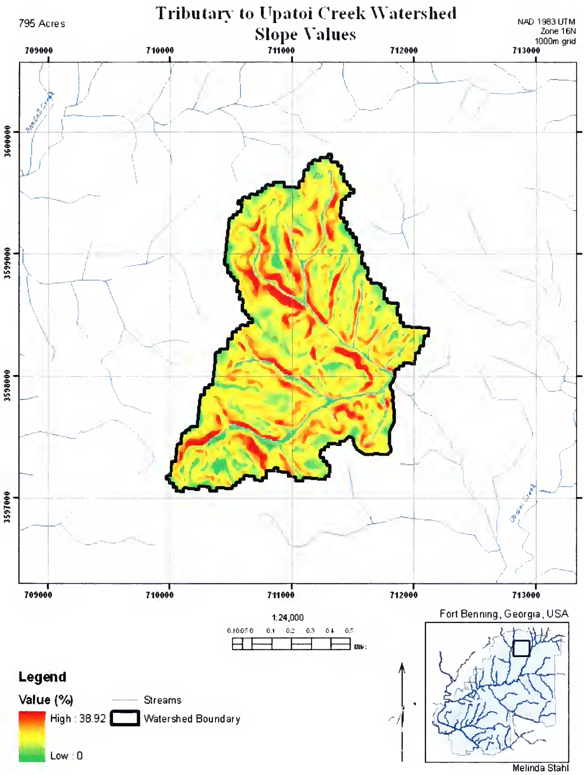

1410 Acres
Tributary to Ochillee Creek Watershed
Soil Erodibility Index
NAD 1983 UTM
Zone 16N
1000m grid
712000
713000
714000
715000
716000
3582000
3581000
3580000
3579000
Ochillee Creek
Legend
CSRK
No Data
0
8.1
16.19
24.29
32.38
48.57
64.76
89.05
161.91
2072.4
Streams
Watershed Boundary
1:24,000
Miles
Fort Benning, Georgia, USA
Melinda Stahl

Unnamed Tributary to Upatoi Creek Watershed Maps

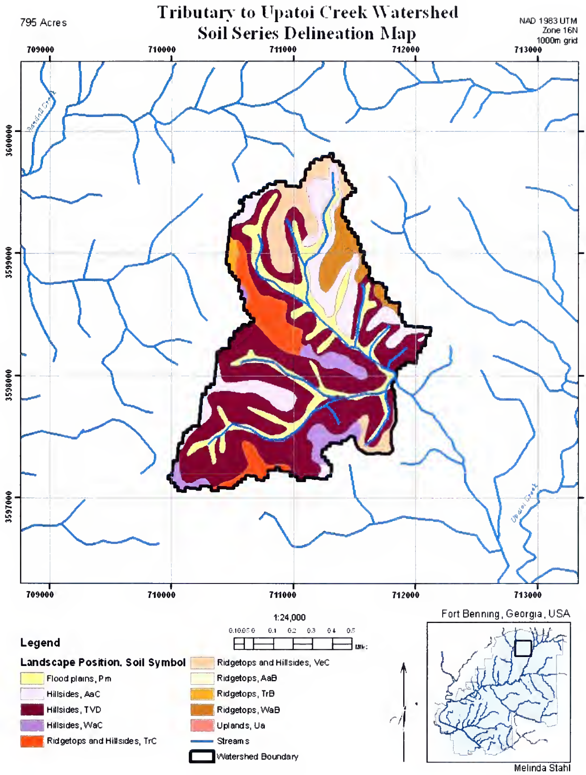
Tributary to Upatoi Creek Watershed
2007 Aerial Photograph

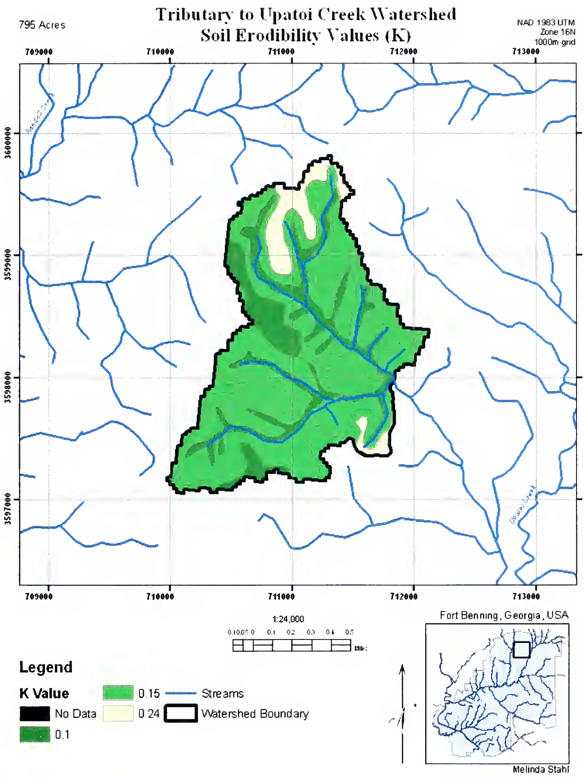



Tributary to Upatoi Creek Watershed
Land Use
795 Acres
NAD 1983 UTM
Zone 16N
1000m grid
709000
710000
711000
712000
713000
3600000
3599000
3598000
3597000
Upatoi Creek
1:24,000
Fort Benning, Georgia, USA
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Streams
Watershed Boundary
Melinda Stahl

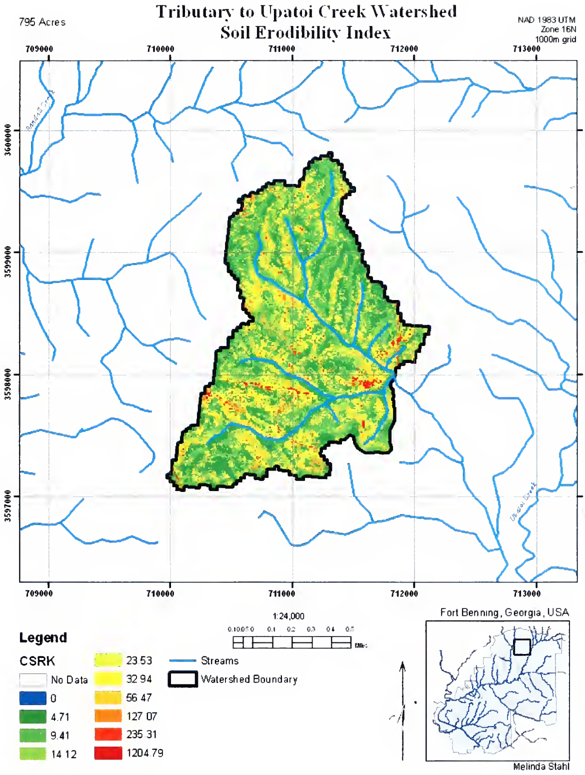


795 Acres
Tributary to Upatoi Creek Watershed
Slope Values
NAD 1983 UTM
Zone 16N
1000m grid
709000
710000
711000
712000
713000
3600000
3599000
3598000
3597000
Upatoi Creek
1:24,000
Miles
Fort Benning, Georgia, USA
Legend
Value (%)
High : 38.92
Low : 0
Streams
Watershed Boundary
Melinda Stahl


795 Acres
Tributary to Upatoi Creek Watershed
Soil Series Delineation Map
NAD 1983 UTM
Zone 16N
1000m grid
709000
710000
711000
712000
713000
3600000
3599000
3598000
3597000
1:24,000
Legend
Landscape Position, Soil Symbol
Flood plains, Pm
Hillsides, AaC
Hillsides, TVD
Hillsides, WaC
Ridgetops and Hillsides, TrC
Ridgetops and Hillsides, VeC
Ridgetops, AaB
Ridgetops, TrB
Ridgetops, WaB
Uplands, Ua
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

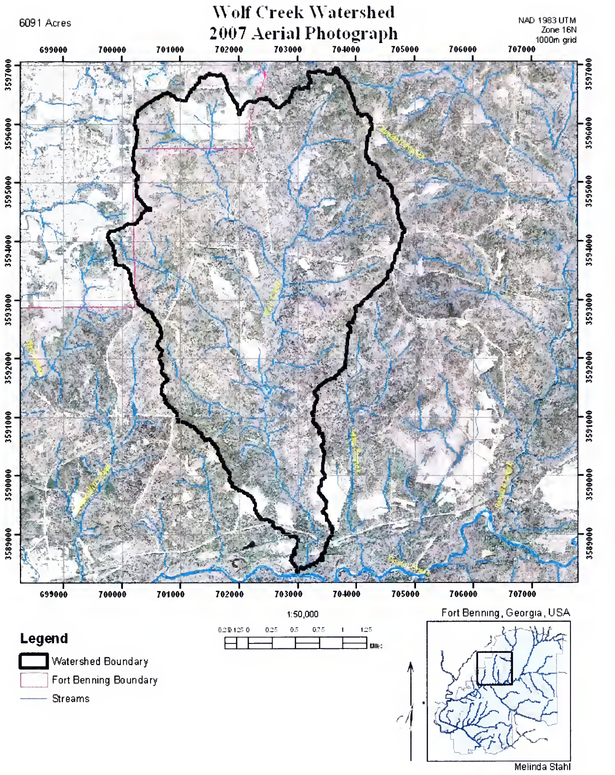


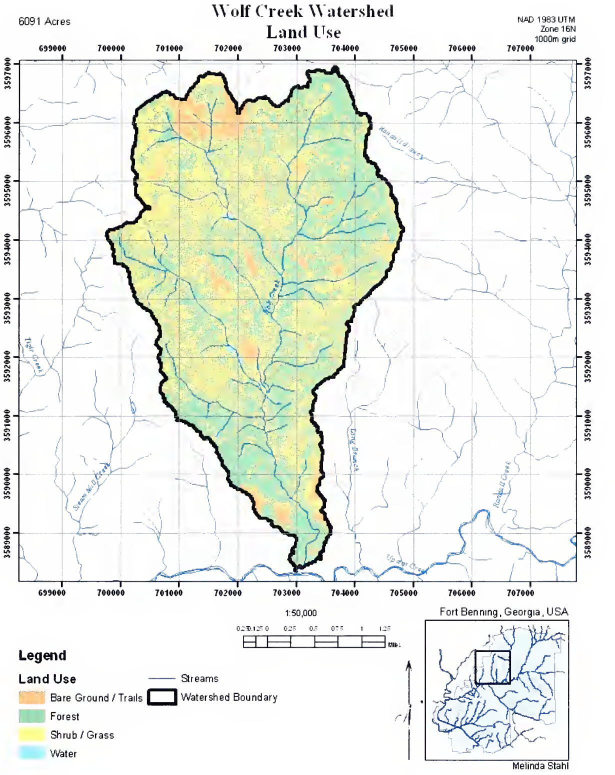
795 Acres
Tributary to Upatoi Creek Watershed
Soil Erodibility Values (K)
NAD 1983 UTM
Zone 16N
1000m grid
709000
710000
711000
712000
713000
3600000
3599000
3598000
3597000
1:24,000
Fort Benning, Georgia, USA
Legend
K Value
No Data
0.1
0.15
0.24
Streams
Watershed Boundary
Melinda Stahl

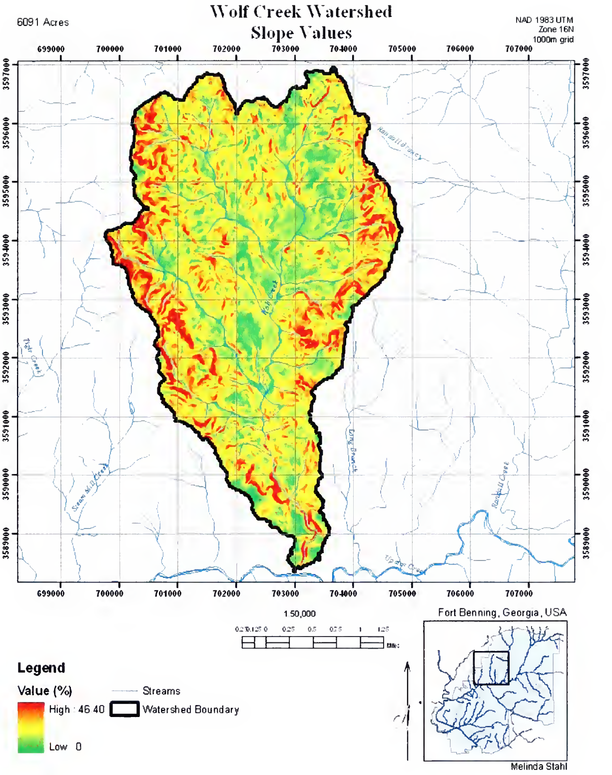


Tributary to Upatoi Creek Watershed
Soil Erodibility Index
795 Acres
NAD 1983 UTM
Zone 16N
1000m grid
709000
710000
711000
712000
713000
3600000
3599000
3598000
3597000
1:24,000
Legend
CSRK
No Data
0
4.71
9.41
14.12
23.53
32.94
56.47
127.07
235.31
1204.79
Streams
Watershed Boundary
Fort Benning, Georgia, USA
Melinda Stahl

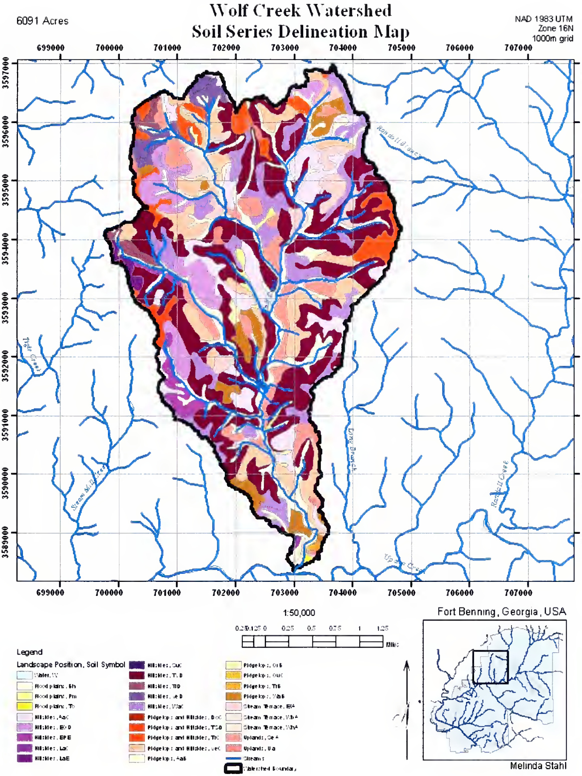
Wolf Creek Watershed Maps


6091 Acres
Wolf Creek Watershed
2007 Aerial Photograph
NAD 1983 UTM
Zone 16N
1000m grid
699000
700000
701000
702000
703000
704000
705000
706000
707000
3597000
3596000
3595000
3594000
3593000
3592000
3591000
3590000
3589000
1:50,000
Miles
Legend
Watershed Boundary
Fort Benning Boundary
Streams
Fort Benning, Georgia, USA
Melinda Stahl

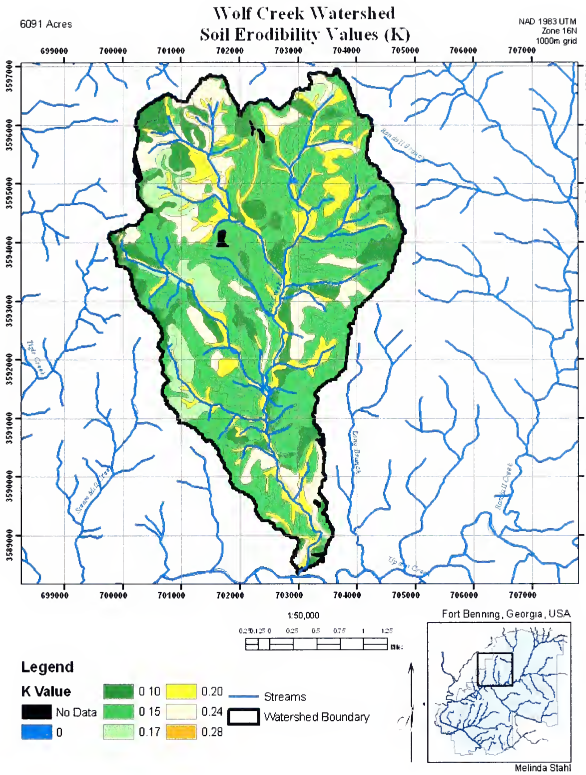

Wolf Creek Watershed
Land Use
6091 Acres
NAD 1983 UTM
Zone 16N
1000m grid
699000
700000
701000
702000
703000
704000
705000
706000
707000
3597000
3596000
3595000
3594000
3593000
3592000
3591000
3590000
3589000
1:50,000
0.25 0.125 0 0.25 0.5 0.75 1 1.25
Miles
Fort Benning, Georgia, USA
Legend
Land Use
Bare Ground / Trails
Forest
Shrub / Grass
Water
Streams
Watershed Boundary
Melinda Stahl



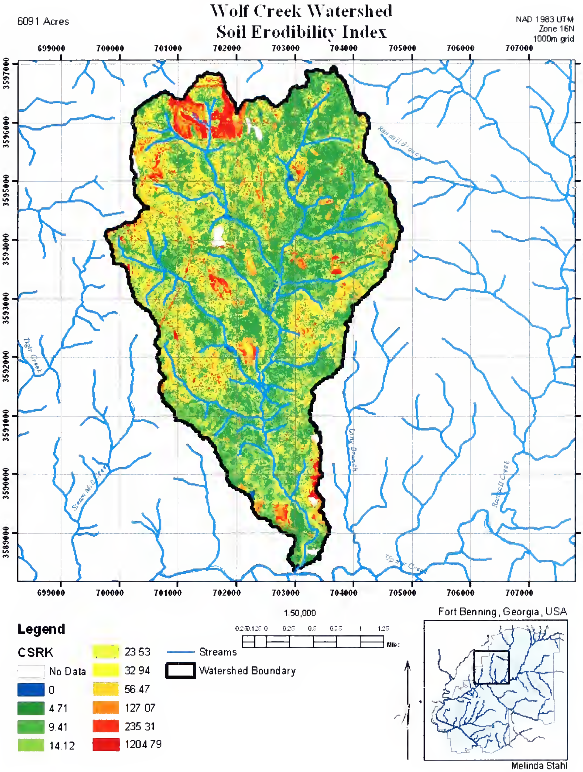
Wolf Creek Watershed
Slope Values
6091 Acres
NAD 1983 UTM
Zone 16N
1000m grid
699000
700000
701000
702000
703000
704000
705000
706000
707000
3597000
3596000
3595000
3594000
3593000
3592000
3591000
3590000
3589000
Wolf Creek
Long Branch
1:50,000
Miles
Fort Benning, Georgia, USA
Legend
Value (%)
High : 46.40
Low : 0
Streams
Watershed Boundary
Melinda Stahl



Wolf Creek Watershed
Soil Series Delineation Map
6091 Acres
NAD 1983 UTM
Zone 16N
1000m grid
699000
700000
701000
702000
703000
704000
705000
706000
707000
3597000
3596000
3595000
3594000
3593000
3592000
3591000
3590000
3589000
1:50,000
Miles
Fort Benning, Georgia, USA
Melinda Stahl
Legend
Landscape Position, Soil Symbol
Flood plains, Pm
Flood plains, To
Hillsides, LaE
Stream Terrace, EfA
Uplands, Oe A
Streams
Watershed Boundary



Wolf Creek Watershed
Soil Erodibility Values (K)
6091 Acres
NAD 1983 UTM
Zone 16N
1000m grid
699000
700000
701000
702000
703000
704000
705000
706000
707000
3597000
3596000
3595000
3594000
3593000
3592000
3591000
3590000
3589000
1:50,000
Miles
Fort Benning, Georgia, USA
Legend
K Value
No Data
0
0.10
0.15
0.17
0.20
0.24
0.28
Streams
Watershed Boundary
Melinda Stahl

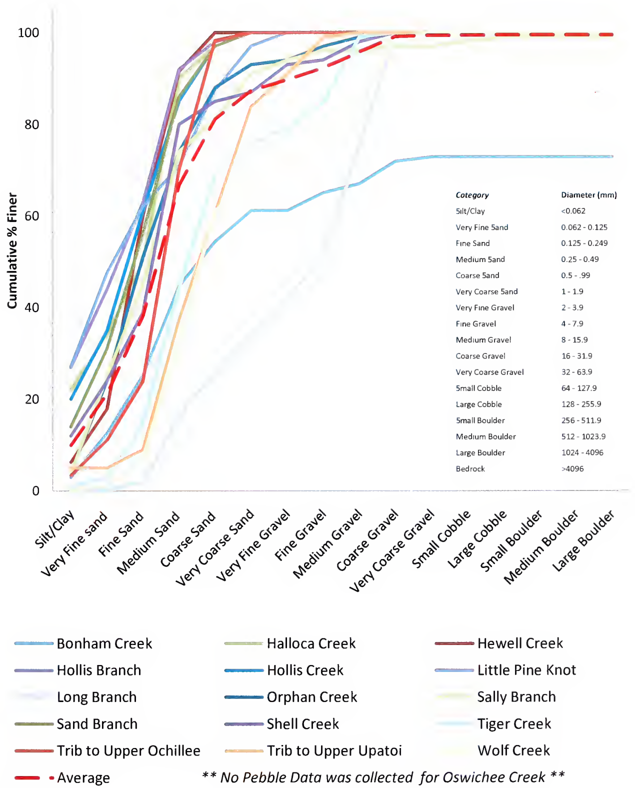

Wolf Creek Watershed
Soil Erodibility Index
6091 Acres
NAD 1983 UTM
Zone 16N
1000m grid
699000
700000
701000
702000
703000
704000
705000
706000
707000
3597000
3596000
3595000
3594000
3593000
3592000
3591000
3590000
3589000
Legend
CSRK
No Data
0
4 71
9.41
14.12
23 53
32 94
56 47
127 07
235 31
1204 79
Streams
Watershed Boundary
1 50,000
Fort Benning, Georgia, USA
Melinda Stahl

APPENDIX B - Soil Series Data

Soil Symbol	Soil Description	% slope	K Value	Landscape Position
AaB	Ailey loamy coarse sand	2-5	0.15	Ridgetops
AaC	Ailey loamy coarse sand	5-8	0.15	Hillsides
Bh	Bibb sandy loam		0.20	Flood plains
Ch	Chastain loam		0.32	Flood plains
COC	Cowarts and Ailey soils	5-12	0.15	Ridgetops and Hillsides
COD	Cowarts and Ailey soils	12-18	0.15	Hillsides
COE	Cowarts and Ailey soils	12-25	0.15	Hillsides
CWE	Cowarts and Ailey soils	18-25	0.15	Hillsides
DoB	Dothan loamy sand	2-5	0.15	Ridgetops
DoC	Dothan loamy sand	5-8	0.15	Ridgetops and Hillsides
DuB	Dothan -Urban land complex	2-5	0.15	Ridgetops
EmB	Esto sandy loam	2-5	0.28	Ridgetops and Hillsides
EmC	Esto sandy loam	5-8	0.28	Hillsides
EmD	Esto sandy loam	8-15	0.28	Hillsides
EnE	Esto-Urban land complex	8-25	0.28	Hillsides
EOD	Esto, Fuquay and Ailey loamy sands	5-12	0.17	Hillsides
EPE	Esto and Troup loamy sands	12-25	0.17	Hillsides
EtA	Eunola sandy loam	0-3	0.20	Stream Terrace
EuA	Eunol-Urban land complex	0-3	0.20	Stream Terrace
FuB	Fuquay loamy sand	0-5	0.15	Ridgetops and Hillsides
FuC	Fuquay loamy sand	5-8	0.15	Ridgetops and Hillsides
Iu	Iuka sandy loam		0.24	Flood plains
LaB	Lakeland sand	0-5	0.10	Ridgetops and Hillsides
LaC	Lakeland sand	5-12	0.10	Hillsides
LaD	Lakeland sand	12-18	0.10	Hillsides
LaE	Lakeland sand	12-25	0.10	Hillsides
LkE	Lakeland sand	18-25	0.10	Hillsides
LuB	Lucy loamy sand	0-5	0.10	Ridgetops
LuC	Lucy loamy sand	5-8	0.10	Hillsides

Soil Symbol	Soil Description	% slope	K Value	Landscape Position
NaB	Nankin sandy loam	2-5	0.28	Ridgetops
NaC	Nankin sandy loam	5-12	0.28	Ridgetops and Hillsides
NkC3	Nankin sandy clay loam	5-12	0.32	Ridgetops and Hillsides
NkD3	Nankin sandy clay loam	12-18	0.32	Hillsides
NkE3	Nankin sandy clay loam	12-25	0.32	Hillsides
NnE3	Nankin sandy clay loam	18-25	0.32	Hillsides
NnF3	Nankin sandy clay loam	25-35	0.32	Hillsides
Oc	Ochlockonee sandy loam		0.20	Flood plains
OrB	Orangeburg loamy sand	2-5	0.10	Ridgetops
OrC	Orangeburg loamy sand	5-8	0.10	Hillsides
OrD2	Orangeburg sandy loam	8-12	0.20	Hillsides
OuC	Orangeburg-Urban land complex	2-8	0.20	Ridgetops
Pm	Pelham loamy sand	0-2	0.10	Flood plains
Ps	Psamments			Uplands
SeA	Stilson loamy sand	0-3	0.10	Uplands
SuC	Susquehanna sandy loam	5-8	0.28	Hillsides
To	Toccoa sandy loam	0-2	0.10	Flood plains
TrB	Troup loamy sand	2-5	0.10	Ridgetops
TrC	Troup loamy sand	5-12	0.10	Ridgetops and Hillsides
TrD	Troup loamy sand	12-18	0.10	Hillsides
TrE	Troup loamy sand	12-25	0.10	Hillsides
TSD	Troup and Esto loamy sands	5-15	0.10	Ridgetops and Hillsides
TuE	Troup loamy sand	18-25	0.10	Hillsides
TVD	Troup, Vaucluse and Pellon loamy sands	8-15	0.15	Hillsides
Ua	Udorthents, loamy			Uplands
VeC	Vaucluse sandy loam	5-8	0.24	Ridgetops and Hillsides
VeD	Vaucluse sandy loam	8-15	0.24	Hillsides
W	Water		0.00	
WaB	Wagram loamy sand	2-5	0.15	Ridgetops
WaC	Wagram loamy sand	5-8	0.15	Hillsides
WbA	Wahee fine sandy loam	0-2	0.24	Stream Terrace
WhA	Wickham fine sandy loam	0-2	0.24	Stream Terrace

APPENDIX C - Wolman Pebble Count Data Grain Size Distribution Comparison

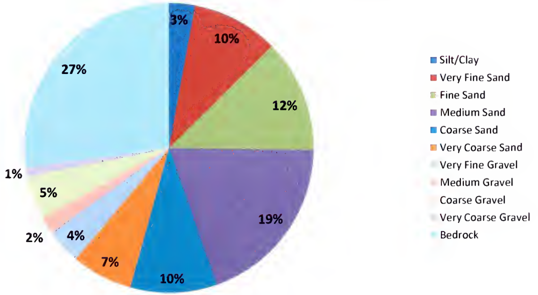


*** No Pebble Data was collected for Oswichee Creek ***

Bonham Creek Pebble Data

		Bonham Creek			Average	
Category	Diameter (mm)	Count	Corrected Count (#/Total x 100)	% Finer	Count	% Finer
Silt/Clay	<0.062	3	3	--	10	--
Very Fine Sand	0.062 - 0.125	10	10	3	11	10
Fine Sand	0.125 - 0.249	13	13	13	17	21
Medium Sand	0.25 - 0.49	20	19	25	29	37
Coarse Sand	0.5 - .99	10	10	45	13	66
Very Coarse Sand	1 - 1.9	7	7	54	6	79
Very Fine Gravel	2 - 3.9	0	0	61	2	86
Fine Gravel	4 - 7.9	4	4	61	2	88
Medium Gravel	8 - 15.9	2	2	65	4	91
Coarse Gravel	16 - 31.9	5	5	67	3	95
Very Coarse Gravel	32 - 63.9	1	1	72	0	98
Small Cobble	64 - 127.9	0	0	73	0	98
Large Cobble	128 - 255.9	0	0	73	0	98
Small Boulder	256 - 511.9	0	0	73	0	98
Medium Boulder	512 - 1023.9	0	0	73	0	98
Large Boulder	1024 - 4096	0	0	73	0	98
Bedrock	>4096	28	27	73	2	98
Total		103	100		100	

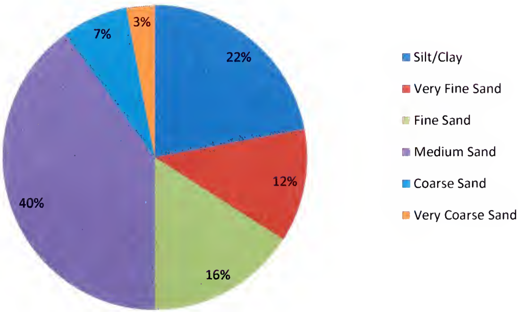
Bonham Creek Pebble Data



Halloca Creek Pebble Data

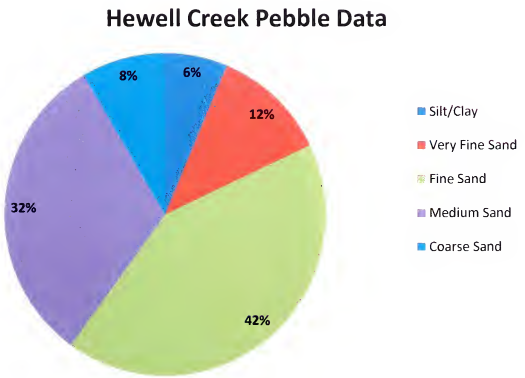
		Halloca Creek		Average	
Category	Diameter (mm)	Count	% Finer	Count	% Finer
Silt/Clay	<0.062	22	--	10	--
Very Fine Sand	0.062 - 0.125	12	22	11	10
Fine Sand	0.125 - 0.249	16	34	17	21
Medium Sand	0.25 - 0.49	40	50	29	37
Coarse Sand	0.5 - .99	7	90	13	66
Very Coarse Sand	1 - 1.9	3	97	6	79
Very Fine Gravel	2 - 3.9	0	100	2	86
Fine Gravel	4 - 7.9	0	100	2	88
Medium Gravel	8 - 15.9	0	100	4	91
Coarse Gravel	16 - 31.9	0	100	3	95
Very Coarse Gravel	32 - 63.9	0	100	0	98
Small Cobble	64 - 127.9	0	100	0	98
Large Cobble	128 - 255.9	0	100	0	98
Small Boulder	256 - 511.9	0	100	0	98
Medium Boulder	512 - 1023.9	0	100	0	98
Large Boulder	1024 - 4096	0	100	0	98
Bedrock	>4096	0	100	2	98
Total		100		100	

Halloca Creek Pebble Data



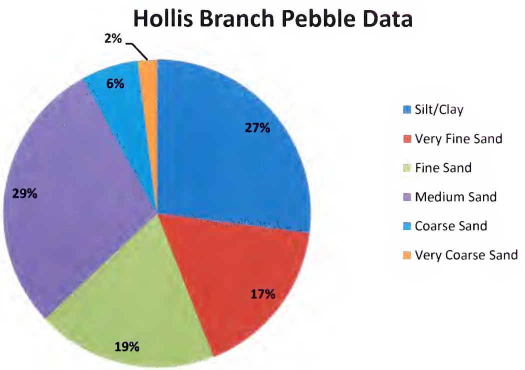
Hewell Creek Pebble Data

Category	Diameter (mm)	Hewell Creek Count	Hewell Creek Corrected Count (#/Total x 100)	Hewell Creek % Finer	Average Count	Average % Finer
Silt/Clay	<0.062	6	6	--	10	--
Very Fine Sand	0.062 - 0.125	11	12	6	11	10
Fine Sand	0.125 - 0.249	40	42	18	17	21
Medium Sand	0.25 - 0.49	30	32	60	29	37
Coarse Sand	0.5 - .99	8	8	92	13	66
Very Coarse Sand	1 - 1.9	0	0	100	6	79
Very Fine Gravel	2 - 3.9	0	0	100	2	86
Fine Gravel	4 - 7.9	0	0	100	2	88
Medium Gravel	8 - 15.9	0	0	100	4	91
Coarse Gravel	16 - 31.9	0	0	100	3	95
Very Coarse Gravel	32 - 63.9	0	0	100	0	98
Small Cobble	64 - 127.9	0	0	100	0	98
Large Cobble	128 - 255.9	0	0	100	0	98
Small Boulder	256 - 511.9	0	0	100	0	98
Medium Boulder	512 - 1023.9	0	0	100	0	98
Large Boulder	1024 - 4096	0	0	100	0	98
Bedrock	>4096	0	0	100	2	98
Total		95	100		100	



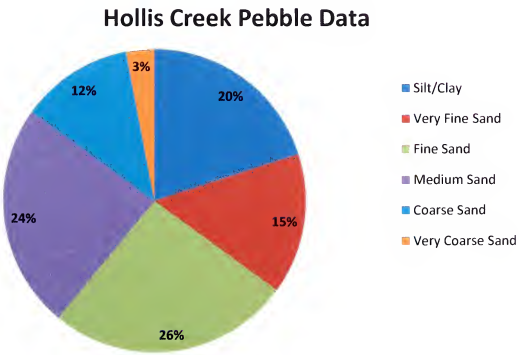
Hollis Branch Pebble Data

		Hollis Branch		Average	
Category	Diameter (mm)	Count	% Finer	Count	% Finer
Silt/Clay	<0.062	27	--	10	--
Very Fine Sand	0.062 - 0.125	17	27	11	10
Fine Sand	0.125 - 0.249	19	44	17	21
Medium Sand	0.25 - 0.49	29	63	29	37
Coarse Sand	0.5 - .99	6	92	13	66
Very Coarse Sand	1 - 1.9	2	98	6	79
Very Fine Gravel	2 - 3.9	0	100	2	86
Fine Gravel	4 - 7.9	0	100	2	88
Medium Gravel	8 - 15.9	0	100	4	91
Coarse Gravel	16 - 31.9	0	100	3	95
Very Coarse Gravel	32 - 63.9	0	100	0	98
Small Cobble	64 - 127.9	0	100	0	98
Large Cobble	128 - 255.9	0	100	0	98
Small Boulder	256 - 511.9	0	100	0	98
Medium Boulder	512 - 1023.9	0	100	0	98
Large Boulder	1024 - 4096	0	100	0	98
Bedrock	>4096	0	100	2	98
Total		100		100	



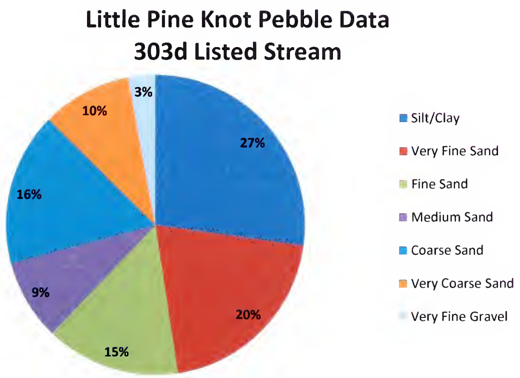
Hollis Creek Pebble Data

		Hollis Creek		Average	
Category	Diameter (mm)	Count	% Finer	Count	% Finer
Silt/Clay	<0.062	20	--	10	--
Very Fine Sand	0.062 - 0.125	15	20	11	10
Fine Sand	0.125 - 0.249	26	35	17	21
Medium Sand	0.25 - 0.49	24	61	29	37
Coarse Sand	0.5 - .99	12	85	13	66
Very Coarse Sand	1 - 1.9	3	97	6	79
Very Fine Gravel	2 - 3.9	0	100	2	86
Fine Gravel	4 - 7.9	0	100	2	88
Medium Gravel	8 - 15.9	0	100	4	91
Coarse Gravel	16 - 31.9	0	100	3	95
Very Coarse Gravel	32 - 63.9	0	100	0	98
Small Cobble	64 - 127.9	0	100	0	98
Large Cobble	128 - 255.9	0	100	0	98
Small Boulder	256 - 511.9	0	100	0	98
Medium Boulder	512 - 1023.9	0	100	0	98
Large Boulder	1024 - 4096	0	100	0	98
Bedrock	>4096	0	100	2	98
Total		100		100	



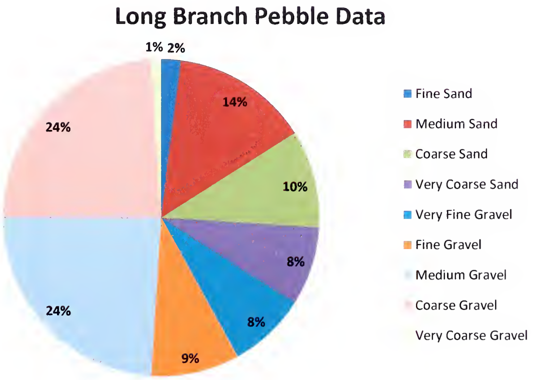
Little Pine Knot Pebble Data

		Little Pine Knot			Average	
Category	Diameter (mm)	Count	Corrected Count (#/Total x 100)	% Finer	Count	% Finer
Silt/Clay	<0.062	28	27	--	10	--
Very Fine Sand	0.062 - 0.125	21	20	27	11	10
Fine Sand	0.125 - 0.249	15	15	48	17	21
Medium Sand	0.25 - 0.49	9	9	62	29	37
Coarse Sand	0.5 - .99	17	17	71	13	66
Very Coarse Sand	1 - 1.9	10	10	87	6	79
Very Fine Gravel	2 - 3.9	3	3	97	2	86
Fine Gravel	4 - 7.9	0	0	100	2	88
Medium Gravel	8 - 15.9	0	0	100	4	91
Coarse Gravel	16 - 31.9	0	0	100	3	95
Very Coarse Gravel	32 - 63.9	0	0	100	0	98
Small Cobble	64 - 127.9	0	0	100	0	98
Large Cobble	128 - 255.9	0	0	100	0	98
Small Boulder	256 - 511.9	0	0	100	0	98
Medium Boulder	512 - 1023.9	0	0	100	0	98
Large Boulder	1024 - 4096	0	0	100	0	98
Bedrock	>4096	0	0	100	2	98
Total		103	100		100	



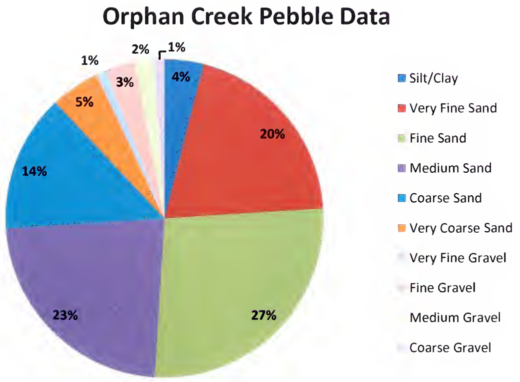
Long Branch Pebble Data

		Long Branch		Average	
Category	Diameter (mm)	Count	% Finer	Count	% Finer
Silt/Clay	<0.062	0	--	10	--
Very Fine Sand	0.062 - 0.125	0	0	11	10
Fine Sand	0.125 - 0.249	2	0	17	21
Medium Sand	0.25 - 0.49	14	2	29	37
Coarse Sand	0.5 - .99	10	16	13	66
Very Coarse Sand	1 - 1.9	8	26	6	79
Very Fine Gravel	2 - 3.9	8	34	2	86
Fine Gravel	4 - 7.9	9	42	2	88
Medium Gravel	8 - 15.9	24	51	4	91
Coarse Gravel	16 - 31.9	24	75	3	95
Very Coarse Gravel	32 - 63.9	1	99	0	98
Small Cobble	64 - 127.9	0	100	0	98
Large Cobble	128 - 255.9	0	100	0	98
Small Boulder	256 - 511.9	0	100	0	98
Medium Boulder	512 - 1023.9	0	100	0	98
Large Boulder	1024 - 4096	0	100	0	98
Bedrock	>4096	0	100	2	98
Total		100		100	



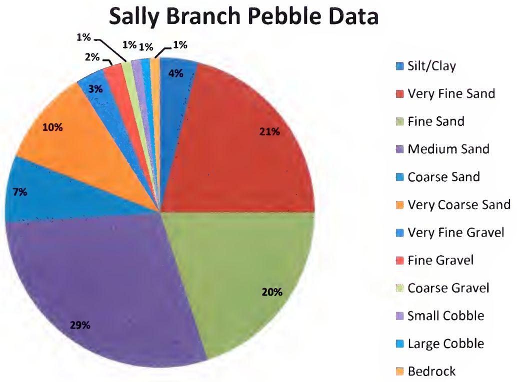
Orphan Creek Pebble Data

		Orphan Creek		Average	
Category	Diameter (mm)	Count	% Finer	Count	% Finer
Silt/Clay	<0.062	4	--	10	--
Very Fine Sand	0.062 - 0.125	20	4	11	10
Fine Sand	0.125 - 0.249	27	24	17	21
Medium Sand	0.25 - 0.49	23	51	29	37
Coarse Sand	0.5 - .99	14	74	13	66
Very Coarse Sand	1 - 1.9	5	88	6	79
Very Fine Gravel	2 - 3.9	1	93	2	86
Fine Gravel	4 - 7.9	3	94	2	88
Medium Gravel	8 - 15.9	2	97	4	91
Coarse Gravel	16 - 31.9	1	99	3	95
Very Coarse Gravel	32 - 63.9	0	100	0	98
Small Cobble	64 - 127.9	0	100	0	98
Large Cobble	128 - 255.9	0	100	0	98
Small Boulder	256 - 511.9	0	100	0	98
Medium Boulder	512 - 1023.9	0	100	0	98
Large Boulder	1024 - 4096	0	100	0	98
Bedrock	>4096	0	100	2	98
Total		100		100	



Sally Branch Creek Pebble Data

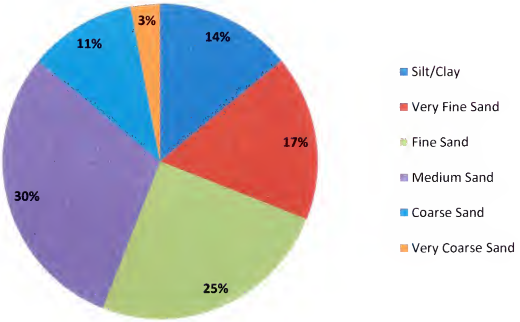
Category	Diameter (mm)	Sally Branch Count	Sally Branch % Finer	Average Count	Average % Finer
Silt/Clay	<0.062	4	--	10	--
Very Fine Sand	0.062 - 0.125	21	4	11	10
Fine Sand	0.125 - 0.249	20	25	17	21
Medium Sand	0.25 - 0.49	29	45	29	37
Coarse Sand	0.5 - .99	7	74	13	66
Very Coarse Sand	1 - 1.9	10	81	6	79
Very Fine Gravel	2 - 3.9	3	91	2	86
Fine Gravel	4 - 7.9	2	94	2	88
Medium Gravel	8 - 15.9	0	96	4	91
Coarse Gravel	16 - 31.9	1	96	3	95
Very Coarse Gravel	32 - 63.9	0	97	0	98
Small Cobble	64 - 127.9	1	97	0	98
Large Cobble	128 - 255.9	1	98	0	98
Small Boulder	256 - 511.9	0	99	0	98
Medium Boulder	512 - 1023.9	0	99	0	98
Large Boulder	1024 - 4096	0	99	0	98
Bedrock	>4096	1	99	2	98
Total		100		100	



Sand Branch Pebble Data

		Sand Branch		Average	
Category	Diameter (mm)	Count	% Finer	Count	% Finer
Silt/Clay	<0.062	14	--	10	--
Very Fine Sand	0.062 - 0.125	17	14	11	10
Fine Sand	0.125 - 0.249	25	31	17	21
Medium Sand	0.25 - 0.49	30	56	29	37
Coarse Sand	0.5 - .99	11	86	13	66
Very Coarse Sand	1 - 1.9	3	97	6	79
Very Fine Gravel	2 - 3.9	0	100	2	86
Fine Gravel	4 - 7.9	0	100	2	88
Medium Gravel	8 - 15.9	0	100	4	91
Coarse Gravel	16 - 31.9	0	100	3	95
Very Coarse Gravel	32 - 63.9	0	100	0	98
Small Cobble	64 - 127.9	0	100	0	98
Large Cobble	128 - 255.9	0	100	0	98
Small Boulder	256 - 511.9	0	100	0	98
Medium Boulder	512 - 1023.9	0	100	0	98
Large Boulder	1024 - 4096	0	100	0	98
Bedrock	>4096	0	100	2	98
Total		100		100	

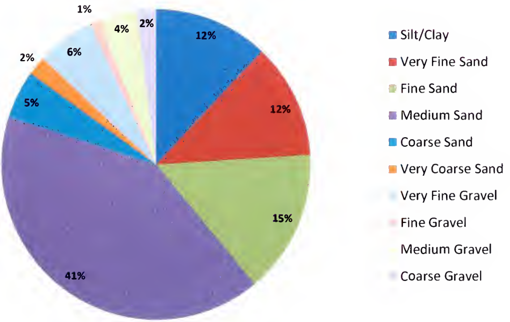
Sand Branch Pebble Data



Shell Creek Pebble Data

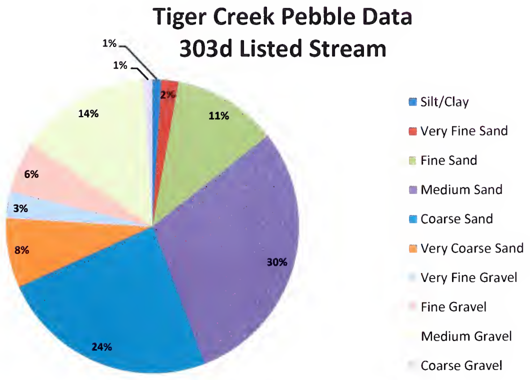
		Shell Creek		Average	
Category	Diameter (mm)	Count	% Finer	Count	% Finer
Silt/Clay	<0.062	12	--	10	--
Very Fine Sand	0.062 - 0.125	12	12	11	10
Fine Sand	0.125 - 0.249	15	24	17	21
Medium Sand	0.25 - 0.49	41	39	29	37
Coarse Sand	0.5 - .99	5	80	13	66
Very Coarse Sand	1 - 1.9	2	85	6	79
Very Fine Gravel	2 - 3.9	6	87	2	86
Fine Gravel	4 - 7.9	1	93	2	88
Medium Gravel	8 - 15.9	4	94	4	91
Coarse Gravel	16 - 31.9	2	98	3	95
Very Coarse Gravel	32 - 63.9	0	100	0	98
Small Cobble	64 - 127.9	0	100	0	98
Large Cobble	128 - 255.9	0	100	0	98
Small Boulder	256 - 511.9	0	100	0	98
Medium Boulder	512 - 1023.9	0	100	0	98
Large Boulder	1024 - 4096	0	100	0	98
Bedrock	>4096	0	100	2	98
Total		100		100	

Shell Creek Pebble Data



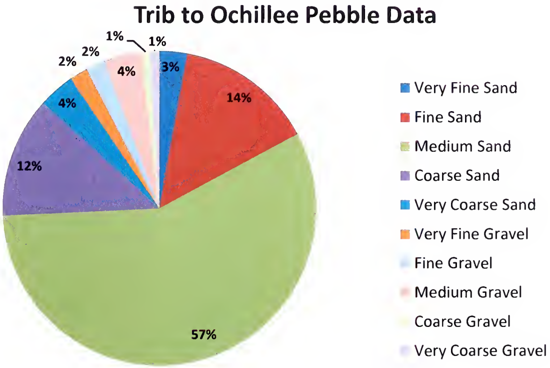
Tiger Creek Pebble Data

Category	Diameter (mm)	Tiger Creek Count	Tiger Creek Corrected Count (#/Total x 100)	Tiger Creek % Finer	Average Count	Average % Finer
Silt/Clay	<0.062	1	1	--	10	--
Very Fine Sand	0.062 - 0.125	2	2	1	11	10
Fine Sand	0.125 - 0.249	12	12	3	17	21
Medium Sand	0.25 - 0.49	31	30	14	29	37
Coarse Sand	0.5 - .99	25	24	44	13	66
Very Coarse Sand	1 - 1.9	8	8	68	6	79
Very Fine Gravel	2 - 3.9	3	3	76	2	86
Fine Gravel	4 - 7.9	6	6	79	2	88
Medium Gravel	8 - 15.9	15	14	85	4	91
Coarse Gravel	16 - 31.9	1	1	99	3	95
Very Coarse Gravel	32 - 63.9	0	0	100	0	98
Small Cobble	64 - 127.9	0	0	100	0	98
Large Cobble	128 - 255.9	0	0	100	0	98
Small Boulder	256 - 511.9	0	0	100	0	98
Medium Boulder	512 - 1023.9	0	0	100	0	98
Large Boulder	1024 - 4096	0	0	100	0	98
Bedrock	>4096	0	0	100	2	98
Total		104	100		100	



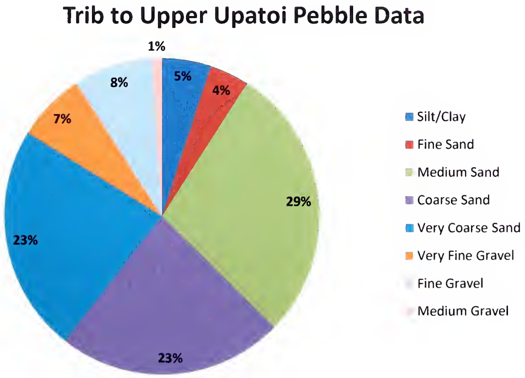
Unnamed Tributary to Ochillee Creek Pebble Data

		Trib to Ochillee			Average	
Category	Diameter (mm)	Count	Corrected Count (#/Total x 100)	% Finer	Count	% Finer
Silt/Clay	<0.062	0	0	--	10	--
Very Fine Sand	0.062 - 0.125	3	3	3	11	10
Fine Sand	0.125 - 0.249	15	14	14	17	21
Medium Sand	0.25 - 0.49	60	57	74	29	37
Coarse Sand	0.5 - .99	13	12	87	13	66
Very Coarse Sand	1 - 1.9	4	4	90	6	79
Very Fine Gravel	2 - 3.9	2	2	92	2	86
Fine Gravel	4 - 7.9	2	2	94	2	88
Medium Gravel	8 - 15.9	4	4	98	4	91
Coarse Gravel	16 - 31.9	1	1	99	3	95
Very Coarse Gravel	32 - 63.9	1	1	100	0	98
Small Cobble	64 - 127.9	0	0	100	0	98
Large Cobble	128 - 255.9	0	0	100	0	98
Small Boulder	256 - 511.9	0	0	100	0	98
Medium Boulder	512 - 1023.9	0	0	100	0	98
Large Boulder	1024 - 4096	0	0	100	0	98
Bedrock	>4096	0	0	100	2	98
Total		105	100		100	



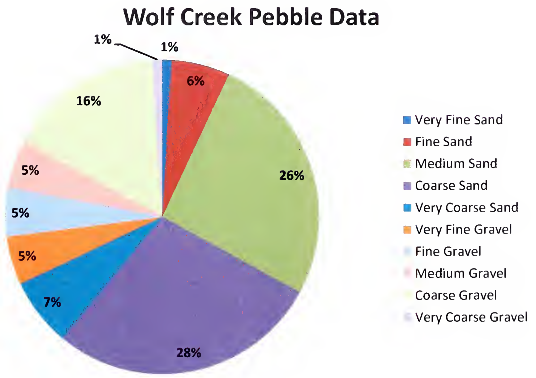
Unnamed Tributary to Upatoi Creek Pebble Data

		Trib to Upper Upatoi			Average	
Category	Diameter (mm)	Count	Corrected Count (#/Total x 100)	% Finer	Count	% Finer
Silt/Clay	<0.062	5	5	--	10	--
Very Fine Sand	0.062 - 0.125	0	0	5	11	10
Fine Sand	0.125 - 0.249	4	4	5	17	21
Medium Sand	0.25 - 0.49	28	28	9	29	37
Coarse Sand	0.5 - .99	23	23	37	13	66
Very Coarse Sand	1 - 1.9	23	23	61	6	79
Very Fine Gravel	2 - 3.9	7	7	84	2	86
Fine Gravel	4 - 7.9	8	8	91	2	88
Medium Gravel	8 - 15.9	1	1	99	4	91
Coarse Gravel	16 - 31.9	0	0	100	3	95
Very Coarse Gravel	32 - 63.9	0	0	100	0	98
Small Cobble	64 - 127.9	0	0	100	0	98
Large Cobble	128 - 255.9	0	0	100	0	98
Small Boulder	256 - 511.9	0	0	100	0	98
Medium Boulder	512 - 1023.9	0	0	100	0	98
Large Boulder	1024 - 4096	0	0	100	0	98
Bedrock	>4096	0	0	100	2	98
Total		99	100		100	

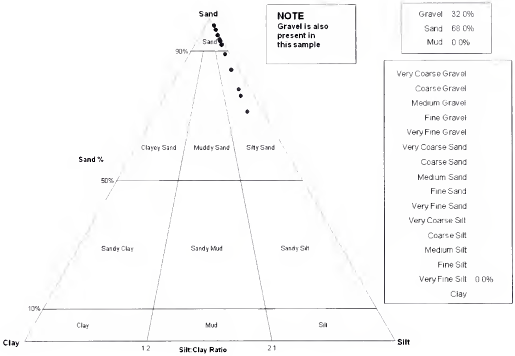


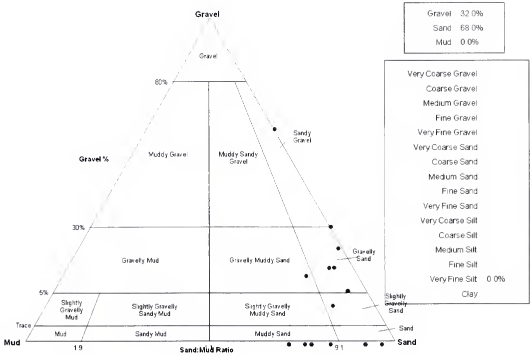
Wolf Creek Pebble Data

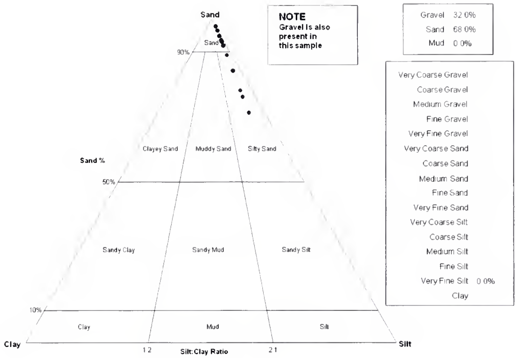
Category	Diameter (mm)	Wolf Creek Count	Wolf Creek % Finer	Average Count	Average % Finer
Silt/Clay	<0.062	0	--	10	--
Very Fine Sand	0.062 - 0.125	1	0	11	10
Fine Sand	0.125 - 0.249	6	1	17	21
Medium Sand	0.25 - 0.49	26	7	29	37
Coarse Sand	0.5 - .99	28	33	13	66
Very Coarse Sand	1 - 1.9	7	61	6	79
Very Fine Gravel	2 - 3.9	5	68	2	86
Fine Gravel	4 - 7.9	5	73	2	88
Medium Gravel	8 - 15.9	5	78	4	91
Coarse Gravel	16 - 31.9	16	83	3	95
Very Coarse Gravel	32 - 63.9	1	99	0	98
Small Cobble	64 - 127.9	0	100	0	98
Large Cobble	128 - 255.9	0	100	0	98
Small Boulder	256 - 511.9	0	100	0	98
Medium Boulder	512 - 1023.9	0	100	0	98
Large Boulder	1024 - 4096	0	100	0	98
Bedrock	>4096	0	100	2	98
Total		100		100	

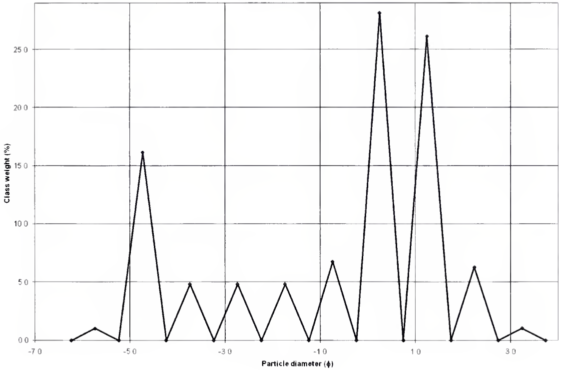


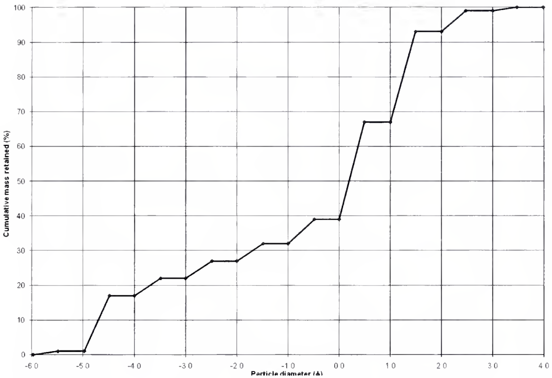
Gradistats Results



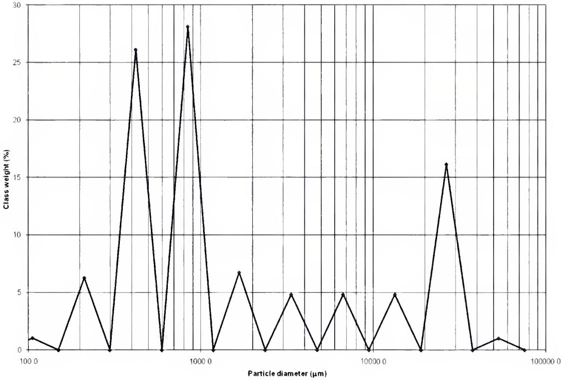



Sand
NOTE
Gravel is also present in this sample
Gravel 32 0%
Sand 68 0%
Mud 0 0%
Very Coarse Gravel
Coarse Gravel
Medium Gravel
Fine Gravel
Very Fine Gravel
Very Coarse Sand
Coarse Sand
Medium Sand
Fine Sand
Very Fine Sand
Very Coarse Silt
Coarse Silt
Medium Silt
Fine Silt
Very Fine Silt 0 0%
Clay
Sand
90%
Clayey Sand
Muddy Sand
Silty Sand
Sand %
50%
Sandy Clay
Sandy Mud
Sandy Silt
10%
Clay
Mud
Silt
Clay
Silt
1 2
Silt:Clay Ratio
2 1

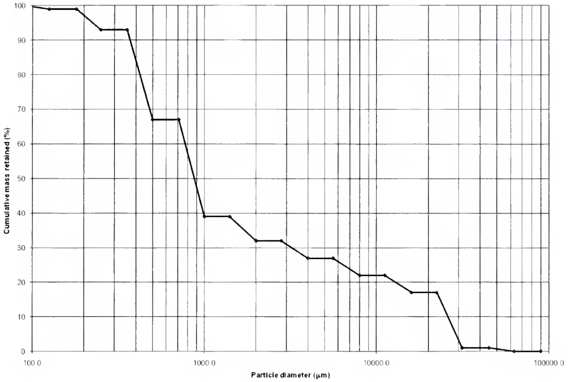

25 0
20 0
15 0
10 0
5 0
0 0
Class weight (%)
-7 0
-5 0
-3 0
-1 0
1 0
3 0
Particle diameter (ϕ)



Cumulative mass retained (%)
100
90
80
70
60
50
40
30
20
10
0
-6 0
-5 0
-4 0
-3 0
-2 0
-1 0
0 0
1 0
2 0
3 0
4 0
Particle diameter (ϕ)



Class weight (%)
30
25
20
15
10
5
0
100 0
1000 0
10000 0
100000 0
Particle diameter (μm)


Cumulative mass retained (%)
Particle diameter (μm)
100
90
80
70
60
50
40
30
20
10
0
100 0
1000 0
10000 0
100000 0

SAMPLE STATISTICS

		Bonham	Halloca	Hewell	Hollis Branch
	ANALYST AND DATE:	,	,	,	,
	SIEVING ERROR:				
	SAMPLE TYPE:	Polymodal, Very Poorly Sorted	Polymodal, Very Poorly Sorted	Polymodal, Poorly Sorted	Polymodal, Very Poorly Sorted
	TEXTURAL GROUP:	Gravelly Sand	Muddy Sand	Sand	Muddy Sand
	SEDIMENT NAME:	Coarse Gravelly Medium Sand	Coarse Silty Medium Sand	Poorly Sorted Fine Sand	Very Coarse Silty Medium Sand
METHOD OF MOMENTS Arithmetic (µm)	MEAN ($\bar{x}_a$)	3725.5	336.2	310.3	277.0
	SORTING (σ_a):	9084.5	327.0	203.8	298.2
	SKEWNESS (Sk_a):	3.417	2.237	1.274	2.464
	KURTOSIS (K_a)	15.61	9.714	4.464	11.37
METHOD OF MOMENTS Geometric (µm)	MEAN ($\bar{x}_g$)	594.3	145.7	222.8	106.9
	SORTING (σ_g):	6.190	5.263	2.733	5.465
	SKEWNESS (Sk_g)	0.404	-0.915	-1.995	-0.625
	KURTOSIS (K_g):	3.598	2.402	7.701	1.909
METHOD OF MOMENTS Logarithmic (φ)	MEAN ($\bar{x}_\phi$)	0.751	2.779	2.166	3.225
	SORTING (σ_ϕ):	2.630	2.396	1.450	2.450
	SKEWNESS (Sk_ϕ):	-0.404	0.915	1.995	0.625
	KURTOSIS (K_ϕ)	3.598	2.402	7.701	1.909
FOLK AND WARD METHOD (µm)	MEAN (M_G):	666.3	170.7	232.4	122.6
	SORTING (σ_G):	6.171	4.155	2.216	4.543
	SKEWNESS (Sk_G):	0.394	-0.700	-0.079	-0.439
	KURTOSIS (K_G):	1.195	1.312	1.574	0.959
FOLK AND WARD METHOD (φ)	MEAN (M_Z)	0.586	2.550	2.105	3.028
	SORTING (σ_I):	2.625	2.055	1.148	2.184
	SKEWNESS (Sk_I):	-0.394	0.700	0.079	0.439
	KURTOSIS (K_G)	1.195	1.312	1.574	0.959
FOLK AND WARD METHOD (Description)	MEAN:	Coarse Sand	Fine Sand	Fine Sand	Very Fine Sand
	SORTING:	Very Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Very Poorly Sorted
	SKEWNESS:	Very Coarse Skewed	Very Fine Skewed	Symmetrical	Very Fine Skewed
	KURTOSIS:	Leptokurtic	Leptokurtic	Very Leptokurtic	Mesokurtic
	MODE 1 (µm):	427.5	427.5	215.0	427.5
	MODE 2 (µm):	215.0	215.0	427.5	215.0
	MODE 3 (µm):	107.5	107.5	107.5	107.5
	MODE 1 (φ):	1.247	1.247	2.237	1.247
	MODE 2 (φ):	2.237	2.237	1.247	2.237
	MODE 3 (φ):	3.237	3.237	3.237	3.237
	D_{10} (µm):	104.0	13.82	100.4	10.94
	D_{50} (µm):	432.9	355.0	231.2	199.7
	D_{90} (µm):	12464.9	710.0	489.4	488.3
	(D_{90} / D_{10}) (µm):	119.9	51.36	4.874	44.64
	(D_{90} - D_{10}) (µm):	12360.9	696.2	389.0	477.4
	(D_{75} / D_{25}) (µm):	6.943	4.501	2.192	7.978
	(D_{75} - D_{25}) (µm):	1229.3	342.0	226.7	357.8
	D_{10} (φ):	-3.640	0.494	1.031	1.034
	D_{50} (φ):	1.208	1.494	2.113	2.324
	D_{90} (φ):	3.265	6.177	3.316	6.514
	(D_{90} / D_{10}) (φ):	-0.897	12.50	3.217	6.300
	(D_{90} - D_{10}) (φ):	6.905	5.682	2.285	5.480
	(D_{75} / D_{25}) (φ):	-4.354	2.831	1.897	3.323
	(D_{75} - D_{25}) (φ):	2.796	2.170	1.132	2.996
	% GRAVEL:	16.2%	0.0%	0.0%	0.0%
	% SAND:	79.7%	78.0%	94.0%	73.1%
	% MUD:	4.0%	22.0%	6.0%	26.9%
	% V COARSE GRAVEL:	1.4%	0.0%	0.0%	0.0%
	% COARSE GRAVEL:	6.8%	0.0%	0.0%	0.0%
	% MEDIUM GRAVEL:	2.7%	0.0%	0.0%	0.0%
	% FINE GRAVEL:	5.4%	0.0%	0.0%	0.0%
	% V FINE GRAVEL:	0.0%	0.0%	0.0%	0.0%
	% V COARSE SAND:	9.5%	3.0%	0.0%	2.0%
	% COARSE SAND:	13.5%	7.0%	8.0%	6.0%
	% MEDIUM SAND:	25.7%	40.0%	32.0%	29.0%
	% FINE SAND:	17.6%	16.0%	42.0%	19.0%
	% V FINE SAND:	13.5%	12.0%	12.0%	17.1%
	% V COARSE SILT:	0.7%	3.7%	1.0%	4.5%
	% COARSE SILT:	0.7%	3.7%	1.0%	4.5%
	% MEDIUM SILT:	0.7%	3.7%	1.0%	4.5%
	% FINE SILT:	0.7%	3.7%	1.0%	4.5%
	% V FINE SILT:	0.7%	3.7%	1.0%	4.5%
	% CLAY:	0.7%	3.7%	1.0%	4.5%

SAMPLE STATISTICS

		Hollis Creek	Little Pine Knot	Long Branch	Orphan
	ANALYST AND DATE:	,	,	,	,
	SIEVING ERROR:				
	SAMPLE TYPE:	Polymodal, Poorly Sorted	Polymodal, Poorly Sorted	Polymodal, Very Poorly Sorted	Polymodal, Poorly Sorted
	TEXTURAL GROUP:	Muddy Sand	Slightly Gravelly Sand	Sandy Gravel	Gravelly Sand
	SEDIMENT NAME:	Very Coarse Silty Fine Sand	htly Very Fine Gravelly Very Fine S	Sandy Coarse Gravel	Fine Gravelly Fine Sand
METHOD OF MOMENTS Arithmetic (µm)	MEAN ($\bar{x}_a$)	334.6	631.9	11441.7	1163.4
	SORTING (σ_a)	346.8	755.6	11062.0	3378.7
	SKEWNESS (Sk_a)	2.055	2.016	0.894	5.570
	KURTOSIS (K_a)	7.965	7.276	3.434	37.84
METHOD OF MOMENTS Geometric (µm)	MEAN ($\bar{x}_g$)	146.3	277.0	4900.0	331.4
	SORTING (σ_g)	4.981	4.478	4.780	4.012
	SKEWNESS (Sk_g)	-0.880	-0.756	-0.469	0.263
	KURTOSIS (K_g)	2.581	3.406	1.772	5.052
METHOD OF MOMENTS Logarithmic (ϕ)	MEAN ($\bar{x}_\phi$)	2.773	1.852	-2.293	1.594
	SORTING (σ_ϕ)	2.316	2.163	2.257	2.004
	SKEWNESS (Sk_ϕ)	0.880	0.756	0.469	-0.263
	KURTOSIS (K_ϕ)	2.581	3.406	1.772	5.052
FOLK AND WARD METHOD (µm)	MEAN (M_G)	157.1	322.9	5179.7	290.6
	SORTING (σ_G)	3.973	3.887	4.734	3.221
	SKEWNESS (Sk_G)	-0.381	0.115	-0.355	0.381
	KURTOSIS (K_G)	1.343	0.921	0.568	1.253
FOLK AND WARD METHOD (ϕ)	MEAN (M_Z)	2.671	1.631	-2.373	1.783
	SORTING (σ_I)	1.990	1.959	2.243	1.687
	SKEWNESS (Sk_I)	0.381	-0.115	0.355	-0.381
	KURTOSIS (K_G)	1.343	0.921	0.568	1.253
FOLK AND WARD METHOD (Description)	MEAN:	Fine Sand	Medium Sand	Fine Gravel	Medium Sand
	SORTING:	Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Poorly Sorted
	SKEWNESS:	Very Fine Skewed	Coarse Skewed	Very Fine Skewed	Very Coarse Skewed
	KURTOSIS:	Leptokurtic	Mesokurtic	Very Platykurtic	Leptokurtic
	MODE 1 (µm):	215.0	107.5	427.5	215.0
	MODE 2 (µm):	427.5	855.0	855.0	427.5
	MODE 3 (µm):	107.5	215.0	6800.0	107.5
	MODE 1 (ϕ):	2.237	3.237	1.247	2.237
	MODE 2 (ϕ):	1.247	0.247	0.247	1.247
	MODE 3 (ϕ):	3.237	2.237	-2.743	3.237
	D_{10} (µm):	15.69	91.64	431.7	99.32
	D_{50} (µm):	217.6	241.9	7689.2	247.0
	D_{90} (µm):	818.9	1667.4	27719.6	1614.7
	(D_{90} / D_{10}) (µm):	52.20	18.19	64.20	16.26
	$(D_{90} - D_{10})$ (µm):	803.2	1575.7	27287.9	1515.4
	(D_{75} / D_{25}) (µm):	4.317	7.723	23.18	3.993
	$(D_{75} - D_{25})$ (µm):	333.1	752.2	21433.7	545.4
	D_{10} (ϕ):	0.288	-0.738	-4.793	-0.691
	D_{50} (ϕ):	2.201	2.047	-2.943	2.018
	D_{90} (ϕ):	5.994	3.448	1.212	3.332
	(D_{90} / D_{10}) (ϕ):	20.80	-4.675	-0.253	-4.820
	$(D_{90} - D_{10})$ (ϕ):	5.706	4.185	6.005	4.023
	(D_{75} / D_{25}) (ϕ):	2.750	15.00	-0.011	5.354
	$(D_{75} - D_{25})$ (ϕ):	2.110	2.949	4.535	1.998
	% GRAVEL:	0.0%	3.7%	66.0%	7.0%
	% SAND:	80.0%	87.7%	34.0%	89.0%
	% MUD:	20.0%	8.6%	0.0%	4.0%
	% V COARSE GRAVEL:	0.0%	0.0%	1.0%	0.0%
	% COARSE GRAVEL:	0.0%	0.0%	24.0%	1.0%
	% MEDIUM GRAVEL:	0.0%	0.0%	24.0%	2.0%
	% FINE GRAVEL:	0.0%	0.0%	9.0%	3.0%
	% V FINE GRAVEL:	0.0%	3.7%	8.0%	1.0%
	% V COARSE SAND:	3.0%	12.3%	8.0%	5.0%
	% COARSE SAND:	12.0%	21.0%	10.0%	14.0%
	% MEDIUM SAND:	24.0%	11.1%	14.0%	23.0%
	% FINE SAND:	26.0%	18.5%	2.0%	27.0%
	% V FINE SAND:	15.0%	24.7%	0.0%	20.0%
	% V COARSE SILT:	3.3%	1.4%	0.0%	0.7%
	% COARSE SILT:	3.3%	1.4%	0.0%	0.7%
	% MEDIUM SILT:	3.3%	1.4%	0.0%	0.7%
	% FINE SILT:	3.3%	1.4%	0.0%	0.7%
	% V FINE SILT:	3.3%	1.4%	0.0%	0.7%
	% CLAY:	3.3%	1.4%	0.0%	0.7%

SAMPLE STATISTICS

		Sally Branch	Sand Branch	Shell	Tiger
	ANALYST AND DATE:	,	,	,	,
	SIEVING ERROR:				
	SAMPLE TYPE:	Polymodal, Poorly Sorted	Polymodal, Poorly Sorted	Trimodal, Very Poorly Sorted	Polymodal, Very Poorly Sorted
	TEXTURAL GROUP:	Gravelly Sand	Muddy Sand	Gravelly Muddy Sand	Gravelly Sand
	SEDIMENT NAME:	Very Fine Gravelly Medium Sand	Very Coarse Silty Medium Sand	Fine Gravelly Coarse Silty Medium	Medium Gravelly Medium Sand
METHOD OF MOMENTS Arithmetic (µm)	MEAN ($\bar{x}_a$)	947.1	349.8	1656.0	3149.7
	SORTING (σ_a)	2867.9	336.5	4529.4	5144.1
	SKEWNESS (Sk_a)	7.788	2.116	4.211	2.069
	KURTOSIS (K_a)	69.33	8.498	21.41	6.963
METHOD OF MOMENTS Geometric (µm)	MEAN ($\bar{x}_g$)	309.8	180.8	308.7	1007.6
	SORTING (σ_g)	4.290	4.196	6.193	4.356
	SKEWNESS (Sk_g)	-0.568	-1.165	-0.153	0.378
	KURTOSIS (K_g)	5.891	3.566	3.709	3.211
METHOD OF MOMENTS Logarithmic (ϕ)	MEAN ($\bar{x}_\phi$)	1.589	2.468	1.696	-0.011
	SORTING (σ_ϕ)	1.932	2.069	2.631	2.123
	SKEWNESS (Sk_ϕ)	0.080	1.165	0.153	-0.378
	KURTOSIS (K_ϕ)	4.806	3.566	3.709	3.211
FOLK AND WARD METHOD (µm)	MEAN (M_G)	389.3	219.4	331.7	1273.0
	SORTING (σ_G):	3.349	2.985	4.961	4.112
	SKEWNESS (Sk_G)	0.143	-0.234	-0.107	0.428
	KURTOSIS (K_G)	1.084	1.337	2.948	1.140
FOLK AND WARD METHOD (ϕ)	MEAN (M_Z)	1.361	2.188	1.592	-0.348
	SORTING (σ_I):	1.744	1.578	2.311	2.040
	SKEWNESS (Sk_I).	-0.143	0.234	0.107	-0.428
	KURTOSIS (K_G)	1.084	1.337	2.948	1.140
FOLK AND WARD METHOD (Description)	MEAN:	Medium Sand	Fine Sand	Medium Sand	Very Coarse Sand
	SORTING:	Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted
	SKEWNESS:	Coarse Skewed	Fine Skewed	Fine Skewed	Very Coarse Skewed
	KURTOSIS:	Mesokurtic	Leptokurtic	Very Leptokurtic	Leptokurtic
	MODE 1 (µm):	427.5	427.5	427.5	427.5
	MODE 2 (µm):	107.5	215.0	215.0	855.0
	MODE 3 (µm):	215.0	107.5	107.5	215.0
	MODE 1 (ϕ):	1.247	1.247	1.247	1.247
	MODE 2 (ϕ):	3.237	2.237	2.237	0.247
	MODE 3 (ϕ):	2.237	3.237	3.237	2.237
	D_{10} (µm):	98.55	28.47	39.63	218.6
	D_{50} (µm):	372.2	231.0	389.2	768.0
	D_{90} (µm):	1809.9	804.2	3346.6	12689.2
	(D_{90} / D_{10}) (µm):	18.37	28.25	84.44	58.04
	(D_{90} - D_{10}) (µm):	1711.4	775.7	3307.0	12470.6
	(D_{75} / D_{25}) (µm):	4.008	3.962	2.606	4.740
	(D_{75} - D_{25}) (µm):	373.0	329.7	295.6	1492.5
	D_{10} (ϕ):	-0.856	0.314	-1.743	-3.666
	D_{50} (ϕ):	1.426	2.114	1.362	0.381
	D_{90} (ϕ):	3.343	5.135	4.657	2.194
	(D_{90} / D_{10}) (ϕ):	-3.906	16.33	-2.672	-0.598
	(D_{90} - D_{10}) (ϕ):	4.199	4.820	6.400	5.859
	(D_{75} / D_{25}) (ϕ):	2.986	2.681	2.304	-1.441
	(D_{75} - D_{25}) (ϕ):	2.003	1.986	1.382	2.245
	% GRAVEL:	7.1%	0.0%	13.0%	23.8%
	% SAND:	88.8%	86.0%	75.0%	75.2%
	% MUD:	4.1%	14.0%	12.0%	1.0%
	% V COARSE GRAVEL:	1.0%	0.0%	0.0%	0.0%
	% COARSE GRAVEL:	1.0%	0.0%	2.0%	1.0%
	% MEDIUM GRAVEL:	0.0%	0.0%	4.0%	13.9%
	% FINE GRAVEL:	2.0%	0.0%	1.0%	5.9%
	% V FINE GRAVEL:	3.1%	0.0%	6.0%	3.0%
	% V COARSE SAND:	10.2%	3.0%	2.0%	7.9%
	% COARSE SAND:	7.1%	11.0%	5.0%	23.8%
	% MEDIUM SAND:	29.6%	30.0%	41.0%	29.7%
	% FINE SAND:	20.4%	25.0%	15.0%	11.9%
	% V FINE SAND:	21.4%	17.0%	12.0%	2.0%
	% V COARSE SILT:	0.7%	2.3%	2.0%	0.2%
	% COARSE SILT:	0.7%	2.3%	2.0%	0.2%
	% MEDIUM SILT:	0.7%	2.3%	2.0%	0.2%
	% FINE SILT:	0.7%	2.3%	2.0%	0.2%
	% V FINE SILT:	0.7%	2.3%	2.0%	0.2%
	% CLAY:	0.7%	2.3%	2.0%	0.2%

SAMPLE STATISTICS

		Trib to Ochillee	Trib to Upatoi	Wolf
	ANALYST AND DATE:	,	,	,
	SIEVING ERROR:			
	SAMPLE TYPE:	Polymodal, Poorly Sorted	Polymodal, Poorly Sorted	Polymodal, Very Poorly Sorted
	TEXTURAL GROUP:	Sand	Gravelly Sand	Sandy Gravel
	SEDIMENT NAME:	Poorly Sorted Medium Sand	Fine Gravelly Medium Sand	Sandy Coarse Gravel
METHOD OF	MEAN ($\bar{x}_a$):	507.6	1652.1	6525.5
MOMENTS	SORTING (σ_a):	309.7	2141.9	10741.6
Arithmetic (µm)	SKEWNESS (Sk_a):	1.139	2.815	1.867
	KURTOSIS (K_a):	5.335	12.57	5.977
METHOD OF	MEAN ($\bar{x}_g$):	382.2	813.1	1644.6
MOMENTS	SORTING (σ_g):	2.518	4.090	5.073
Geometric (µm)	SKEWNESS (Sk_g):	-2.226	-1.417	0.705
	KURTOSIS (K_g):	10.01	6.649	2.127
METHOD OF	MEAN ($\bar{x}_\phi$):	1.388	0.299	-0.718
MOMENTS	SORTING (σ_ϕ):	1.332	2.032	2.343
Logarithmic (φ)	SKEWNESS (Sk_ϕ):	2.226	1.417	-0.705
	KURTOSIS (K_ϕ):	10.01	6.649	2.127
FOLK AND	MEAN (M_G):	420.1	976.8	1999.5
WARD METHOD	SORTING (σ_G):	2.016	3.350	5.745
(µm)	SKEWNESS (Sk_G):	-0.175	0.039	0.527
	KURTOSIS (K_G):	1.256	1.374	0.748
FOLK AND	MEAN (M_Z):	1.251	0.034	-1.000
WARD METHOD	SORTING (σ_I):	1.012	1.744	2.522
(φ)	SKEWNESS (Sk_I):	0.175	-0.039	-0.527
	KURTOSIS (K_G):	1.256	1.374	0.748
FOLK AND	MEAN:	Medium Sand	Coarse Sand	Very Coarse Sand
WARD METHOD	SORTING:	Poorly Sorted	Poorly Sorted	Very Poorly Sorted
(Description)	SKEWNESS:	Fine Skewed	Symmetrical	Very Coarse Skewed
	KURTOSIS:	Leptokurtic	Leptokurtic	Platykurtic
	MODE 1 (µm):	427.5	427.5	855.0
	MODE 2 (µm):	855.0	855.0	427.5
	MODE 3 (µm):	215.0	1700.0	1700.0
	MODE 1 (φ):	1.247	1.247	0.247
	MODE 2 (φ):	0.247	0.247	1.247
	MODE 3 (φ):	2.237	-0.743	-0.743
	D_{10} (µm):	120.0	358.9	369.3
	D_{50} (µm):	430.8	855.3	874.1
	D_{90} (µm):	906.8	3820.7	26003.1
	(D_{90} / D_{10}) (µm):	7.558	10.64	70.41
	(D_{90} - D_{10}) (µm):	786.8	3461.8	25633.8
	(D_{75} / D_{25}) (µm):	2.110	4.057	14.35
	(D_{75} - D_{25}) (µm):	397.1	1315.8	6008.8
	D_{10} (φ):	0.141	-1.934	-4.701
	D_{50} (φ):	1.215	0.226	0.194
	D_{90} (φ):	3.059	1.478	1.437
	(D_{90} / D_{10}) (φ):	21.67	-0.764	-0.306
	(D_{90} - D_{10}) (φ):	2.918	3.412	6.138
	(D_{75} / D_{25}) (φ):	3.655	-1.512	-0.428
	(D_{75} - D_{25}) (φ):	1.077	2.020	3.843
	% GRAVEL:	0.0%	16.2%	32.0%
	% SAND:	97.0%	78.8%	68.0%
	% MUD:	3.0%	5.0%	0.0%
	% V COARSE GRAVEL:	0.0%	0.0%	1.0%
	% COARSE GRAVEL:	0.0%	0.0%	16.0%
	% MEDIUM GRAVEL:	0.0%	1.0%	5.0%
	% FINE GRAVEL:	0.0%	8.1%	5.0%
	% V FINE GRAVEL:	0.0%	7.1%	5.0%
	% V COARSE SAND:	2.0%	23.2%	7.0%
	% COARSE SAND:	28.0%	23.2%	28.0%
	% MEDIUM SAND:	46.0%	28.3%	26.0%
	% FINE SAND:	13.0%	4.0%	6.0%
	% V FINE SAND:	8.0%	0.0%	1.0%
	% V COARSE SILT:	0.5%	0.8%	0.0%
	% COARSE SILT:	0.5%	0.8%	0.0%
	% MEDIUM SILT:	0.5%	0.8%	0.0%
	% FINE SILT:	0.5%	0.8%	0.0%
	% V FINE SILT:	0.5%	0.8%	0.0%
	% CLAY:	0.5%	0.8%	0.0%

Bonham

SAMPLE STATISTICS

SAMPLE IDENTITY: **Bonham** ANALYST & DATE: ,

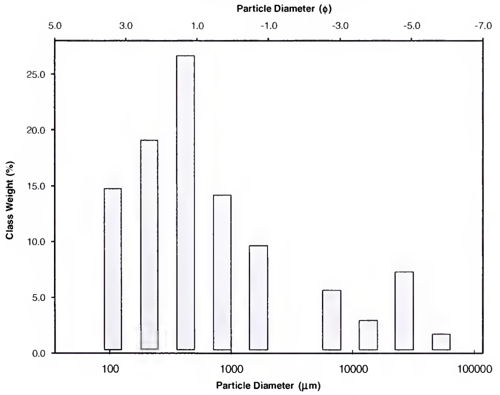
SAMPLE TYPE: Polymodal, Very Poorly Sorted TEXTURAL GROUP: Gravelly Sand

SEDIMENT NAME: Coarse Gravelly Medium Sand

	μm	φ	GRAIN SIZE DISTRIBUTION	
MODE 1:	427.5	1.247	GRAVEL: 16.2%	COARSE SAND: 13.5%
MODE 2:	215.0	2.237	SAND: 79.7%	MEDIUM SAND: 25.7%
MODE 3:	107.5	3.237	MUD: 4.0%	FINE SAND: 17.6%
D_{10}:	104.0	-3.640		V FINE SAND: 13.5%
MEDIAN or D_{50}:	432.9	1.208	V COARSE GRAVEL: 1.4%	V COARSE SILT: 0.7%
D_{90}:	12464.9	3.265	COARSE GRAVEL: 6.8%	COARSE SILT: 0.7%
(D_{90} / D_{10}):	119.9	-0.897	MEDIUM GRAVEL: 2.7%	MEDIUM SILT: 0.7%
$(D_{90} - D_{10})$:	12360.9	6.905	FINE GRAVEL: 5.4%	FINE SILT: 0.7%
(D_{75} / D_{25}):	6.943	-4.354	V FINE GRAVEL: 0.0%	V FINE SILT: 0.7%
$(D_{75} - D_{25})$:	1229.3	2.796	V COARSE SAND: 9.5%	CLAY: 0.7%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	3725.5	594.3	0.751	666.3	0.586	Coarse Sand
SORTING (σ):	9084.5	6.190	2.630	6.171	2.625	Very Poorly Sorted
SKEWNESS (Sk):	3.417	0.404	-0.404	0.394	-0.394	Very Coarse Skewed
KURTOSIS (K):	15.61	3.598	3.598	1.195	1.195	Leptokurtic

GRAIN SIZE DISTRIBUTION



Halloca

SAMPLE STATISTICS

SAMPLE IDENTITY: **Halloca** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Very Poorly Sorted TEXTURAL GROUP: Muddy Sand

SEDIMENT NAME: Coarse Silty Medium Sand

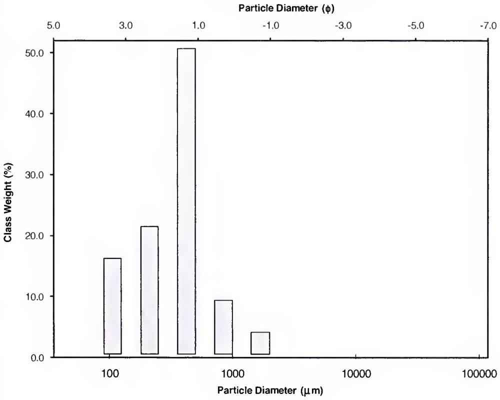
	μm	φ
MODE 1:	427.5	1.247
MODE 2:	215.0	2.237
MODE 3:	107.5	3.237
D_{10}:	13.82	0.494
MEDIAN or D_{50}:	355.0	1.494
D_{90}:	710.0	6.177
(D_{90} / D_{10}):	51.36	12.50
$(D_{90} - D_{10})$:	696.2	5.682
(D_{75} / D_{25}):	4.501	2.831
$(D_{75} - D_{25})$:	342.0	2.170

GRAIN SIZE DISTRIBUTION

GRAVEL:	0.0%	COARSE SAND:	7.0%
SAND:	78.0%	MEDIUM SAND:	40.0%
MUD:	22.0%	FINE SAND:	16.0%
		V FINE SAND:	12.0%
V COARSE GRAVEL:	0.0%	V COARSE SILT:	3.7%
COARSE GRAVEL:	0.0%	COARSE SILT:	3.7%
MEDIUM GRAVEL:	0.0%	MEDIUM SILT:	3.7%
FINE GRAVEL:	0.0%	FINE SILT:	3.7%
V FINE GRAVEL:	0.0%	V FINE SILT:	3.7%
V COARSE SAND:	3.0%	CLAY:	3.7%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	336.2	145.7	2.779	170.7	2.550	Fine Sand
SORTING (σ):	327.0	5.263	2.396	4.155	2.055	Very Poorly Sorted
SKEWNESS (Sk):	2.237	-0.915	0.915	-0.700	0.700	Very Fine Skewed
KURTOSIS (K):	9.714	2.402	2.402	1.312	1.312	Leptokurtic

GRAIN SIZE DISTRIBUTION



Hewell

SAMPLE STATISTICS

SAMPLE IDENTITY: **Hewell Creek** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Poorly Sorted TEXTURAL GROUP: Sand

SEDIMENT NAME: Poorly Sorted Fine Sand

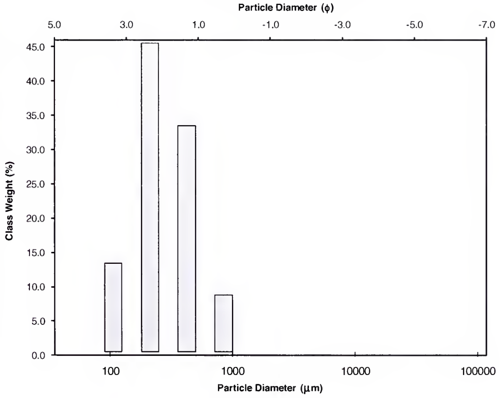
	μm	φ
MODE 1:	215.0	2.237
MODE 2:	427.5	1.247
MODE 3:	107.5	3.237
D_{10}:	100.4	1.031
MEDIAN or D_{50}:	231.2	2.113
D_{90}:	489.4	3.316
(D_{90} / D_{10}):	4.874	3.217
$(D_{90} - D_{10})$:	389.0	2.285
(D_{75} / D_{25}):	2.192	1.897
$(D_{75} - D_{25})$:	226.7	1.132

GRAIN SIZE DISTRIBUTION

GRAVEL:	0.0%	COARSE SAND:	8.0%
SAND:	94.0%	MEDIUM SAND:	32.0%
MUD:	6.0%	FINE SAND:	42.0%
		V FINE SAND:	12.0%
V COARSE GRAVEL:	0.0%	V COARSE SILT:	1.0%
COARSE GRAVEL:	0.0%	COARSE SILT:	1.0%
MEDIUM GRAVEL:	0.0%	MEDIUM SILT:	1.0%
FINE GRAVEL:	0.0%	FINE SILT:	1.0%
V FINE GRAVEL:	0.0%	V FINE SILT:	1.0%
V COARSE SAND:	0.0%	CLAY:	1.0%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	310.3	222.8	2.166	232.4	2.105	Fine Sand
SORTING (σ):	203.8	2.733	1.450	2.216	1.148	Poorly Sorted
SKEWNESS (Sk):	1.274	-1.995	1.995	-0.079	0.079	Symmetrical
KURTOSIS (K):	4.464	7.701	7.701	1.574	1.574	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



Hollis Branch

SAMPLE STATISTICS

SAMPLE IDENTITY: **Hollis Branch** ANALYST & DATE: ,

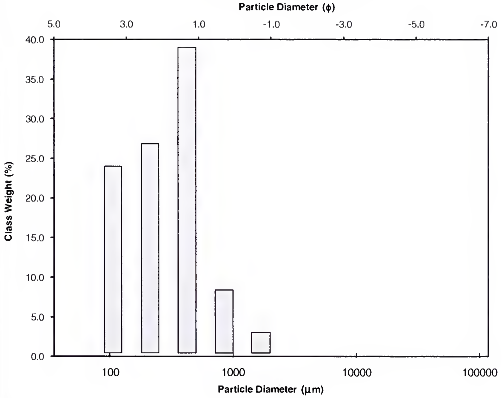
SAMPLE TYPE: Polymodal, Very Poorly Sorted TEXTURAL GROUP: Muddy Sand

SEDIMENT NAME: Very Coarse Silty Medium Sand

	μm	φ	GRAIN SIZE DISTRIBUTION			
MODE 1:	427.5	1.247	GRAVEL:	0.0%	COARSE SAND:	6.0%
MODE 2:	215.0	2.237	SAND:	73.1%	MEDIUM SAND:	29.0%
MODE 3:	107.5	3.237	MUD:	26.9%	FINE SAND:	19.0%
D_{10}:	10.94	1.034			V FINE SAND:	17.1%
MEDIAN or D_{50}:	199.7	2.324	V COARSE GRAVEL:	0.0%	V COARSE SILT:	4.5%
D_{90}:	488.3	6.514	COARSE GRAVEL:	0.0%	COARSE SILT:	4.5%
(D_{90} / D_{10}):	44.64	6.300	MEDIUM GRAVEL:	0.0%	MEDIUM SILT:	4.5%
$(D_{90} - D_{10})$:	477.4	5.480	FINE GRAVEL:	0.0%	FINE SILT:	4.5%
(D_{75} / D_{25}):	7.978	3.323	V FINE GRAVEL:	0.0%	V FINE SILT:	4.5%
$(D_{75} - D_{25})$:	357.8	2.996	V COARSE SAND:	2.0%	CLAY:	4.5%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	277.0	106.9	3.225	122.6	3.028	Very Fine Sand
SORTING (σ):	298.2	5.465	2.450	4.543	2.184	Very Poorly Sorted
SKEWNESS (Sk):	2.464	-0.625	0.625	-0.439	0.439	Very Fine Skewed
KURTOSIS (K):	11.37	1.909	1.909	0.959	0.959	Mesokurtic

GRAIN SIZE DISTRIBUTION



Hollis Creek

SAMPLE STATISTICS

SAMPLE IDENTITY: **Hollis Creek** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Poorly Sorted TEXTURAL GROUP: Muddy Sand

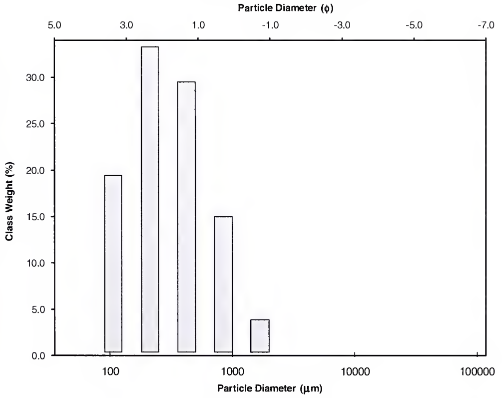
SEDIMENT NAME: Very Coarse Silty Fine Sand

	μm	φ
MODE 1:	215.0	2.237
MODE 2:	427.5	1.247
MODE 3:	107.5	3.237
D_{10}:	15.69	0.288
MEDIAN or D_{50}:	217.6	2.201
D_{90}:	818.9	5.994
(D_{90} / D_{10}):	52.20	20.80
$(D_{90} - D_{10})$:	803.2	5.706
(D_{75} / D_{25}):	4.317	2.750
$(D_{75} - D_{25})$:	333.1	2.110

GRAIN SIZE DISTRIBUTION			
GRAVEL:	0.0%	COARSE SAND:	12.0%
SAND:	80.0%	MEDIUM SAND:	24.0%
MUD:	20.0%	FINE SAND:	26.0%
		V FINE SAND:	15.0%
V COARSE GRAVEL:	0.0%	V COARSE SILT:	3.3%
COARSE GRAVEL:	0.0%	COARSE SILT:	3.3%
MEDIUM GRAVEL:	0.0%	MEDIUM SILT:	3.3%
FINE GRAVEL:	0.0%	FINE SILT:	3.3%
V FINE GRAVEL:	0.0%	V FINE SILT:	3.3%
V COARSE SAND:	3.0%	CLAY:	3.3%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN $(\bar{x})$:	334.6	146.3	2.773	157.1	2.671	Fine Sand
SORTING (σ):	346.8	4.981	2.316	3.973	1.990	Poorly Sorted
SKEWNESS (Sk):	2.055	-0.880	0.880	-0.381	0.381	Very Fine Skewed
KURTOSIS (K):	7.965	2.581	2.581	1.343	1.343	Leptokurtic

GRAIN SIZE DISTRIBUTION



Little Pine Knot

SAMPLE STATISTICS

SAMPLE IDENTITY: **Little Pine Knot** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Very Poorly Sorted TEXTURAL GROUP: Slightly Gravelly Muddy Sand

SEDIMENT NAME: Slightly Very Fine Gravelly Medium Silty Very Fine Sand

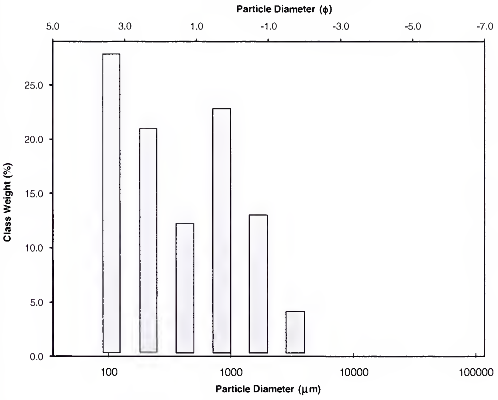
	μm	φ
MODE 1:	107.5	3.237
MODE 2:	855.0	0.247
MODE 3:	215.0	2.237
D_{10}:	11.05	-0.635
MEDIAN or D_{50}:	194.3	2.363
D_{90}:	1552.6	6.499
(D_{90} / D_{10}):	140.5	-10.241
$(D_{90} - D_{10})$:	1541.5	7.134
(D_{75} / D_{25}):	14.85	11.93
$(D_{75} - D_{25})$:	728.7	3.892

GRAIN SIZE DISTRIBUTION

GRAVEL:	3.0%	COARSE SAND:	16.8%
SAND:	70.3%	MEDIUM SAND:	8.9%
MUD:	26.7%	FINE SAND:	14.9%
		V FINE SAND:	19.9%
V COARSE GRAVEL:	0.0%	V COARSE SILT:	4.4%
COARSE GRAVEL:	0.0%	COARSE SILT:	4.4%
MEDIUM GRAVEL:	0.0%	MEDIUM SILT:	4.4%
FINE GRAVEL:	0.0%	FINE SILT:	4.4%
V FINE GRAVEL:	3.0%	V FINE SILT:	4.4%
V COARSE SAND:	9.9%	CLAY:	4.4%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	513.1	136.8	2.870	155.5	2.685	Fine Sand
SORTING (σ):	717.6	7.060	2.820	6.108	2.611	Very Poorly Sorted
SKEWNESS (Sk):	2.273	-0.344	0.344	-0.188	0.188	Fine Skewed
KURTOSIS (K):	8.607	1.839	1.839	0.858	0.858	Platykurtic

GRAIN SIZE DISTRIBUTION



Long Branch

SAMPLE STATISTICS

SAMPLE IDENTITY: **Long Branch** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Very Poorly Sorted TEXTURAL GROUP: Sandy Gravel

SEDIMENT NAME: Sandy Coarse Gravel

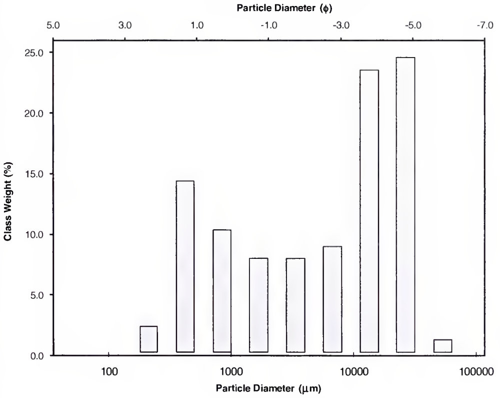
	μm	φ
MODE 1:	427.5	1.247
MODE 2:	855.0	0.247
MODE 3:	6800.0	-2.743
D_{10}:	431.7	-4.793
MEDIAN or D_{50}:	7689.2	-2.943
D_{90}:	27719.6	1.212
(D_{90} / D_{10}):	64.20	-0.253
(D_{90} - D_{10}):	27287.9	6.005
(D_{75} / D_{25}):	23.18	-0.011
(D_{75} - D_{25}):	21433.7	4.535

GRAIN SIZE DISTRIBUTION

GRAVEL:	66.0%	COARSE SAND:	10.0%
SAND:	34.0%	MEDIUM SAND:	14.0%
MUD:	0.0%	FINE SAND:	2.0%
		V FINE SAND:	0.0%
V COARSE GRAVEL:	1.0%	V COARSE SILT:	0.0%
COARSE GRAVEL:	24.0%	COARSE SILT:	0.0%
MEDIUM GRAVEL:	24.0%	MEDIUM SILT:	0.0%
FINE GRAVEL:	9.0%	FINE SILT:	0.0%
V FINE GRAVEL:	8.0%	V FINE SILT:	0.0%
V COARSE SAND:	8.0%	CLAY:	0.0%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	11441.7	4900.0	-2.293	5179.7	-2.373	Fine Gravel
SORTING (σ):	11062.0	4.780	2.257	4.734	2.243	Very Poorly Sorted
SKEWNESS (Sk):	0.894	-0.469	0.469	-0.355	0.355	Very Fine Skewed
KURTOSIS (K):	3.434	1.772	1.772	0.568	0.568	Very Platykurtic

GRAIN SIZE DISTRIBUTION



Orphan

SAMPLE STATISTICS

SAMPLE IDENTITY: **Orphan** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Poorly Sorted TEXTURAL GROUP: Gravelly Sand

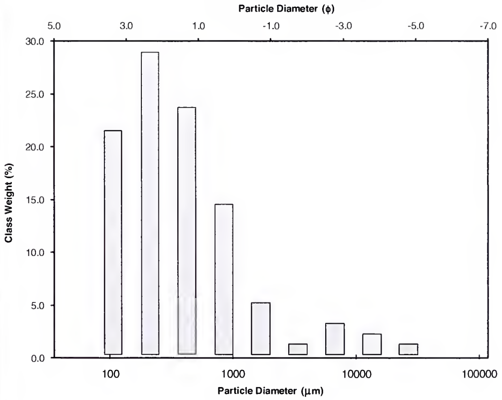
SEDIMENT NAME: Fine Gravelly Fine Sand

	μm	φ
MODE 1:	215.0	2.237
MODE 2:	427.5	1.247
MODE 3:	107.5	3.237
D_{10}:	99.32	-0.691
MEDIAN or D_{50}:	247.0	2.018
D_{90}:	1614.7	3.332
(D_{90} / D_{10}):	16.26	-4.820
$(D_{90} - D_{10})$:	1515.4	4.023
(D_{75} / D_{25}):	3.993	5.354
$(D_{75} - D_{25})$:	545.4	1.998

GRAIN SIZE DISTRIBUTION			
GRAVEL:	7.0%	COARSE SAND:	14.0%
SAND:	89.0%	MEDIUM SAND:	23.0%
MUD:	4.0%	FINE SAND:	27.0%
		V FINE SAND:	20.0%
V COARSE GRAVEL:	0.0%	V COARSE SILT:	0.7%
COARSE GRAVEL:	1.0%	COARSE SILT:	0.7%
MEDIUM GRAVEL:	2.0%	MEDIUM SILT:	0.7%
FINE GRAVEL:	3.0%	FINE SILT:	0.7%
V FINE GRAVEL:	1.0%	V FINE SILT:	0.7%
V COARSE SAND:	5.0%	CLAY:	0.7%

	METHOD OF MOMENTS Arithmetic μm	Geometric μm	Logarithmic φ	FOLK & WARD METHOD Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	1163.4	331.4	1.594	290.6	1.783	Medium Sand
SORTING (σ):	3378.7	4.012	2.004	3.221	1.687	Poorly Sorted
SKEWNESS (Sk):	5.570	0.263	-0.263	0.381	-0.381	Very Coarse Skewed
KURTOSIS (K):	37.84	5.052	5.052	1.253	1.253	Leptokurtic

GRAIN SIZE DISTRIBUTION



Sally Branch

SAMPLE STATISTICS

SAMPLE IDENTITY: **Sally Branch** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Poorly Sorted TEXTURAL GROUP: Gravelly Sand

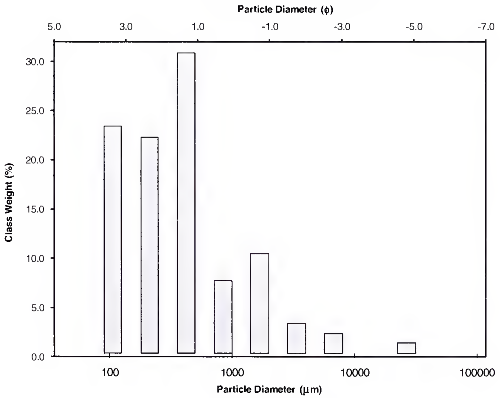
SEDIMENT NAME: Very Fine Gravelly Medium Sand

	μm	φ
MODE 1:	427.5	1.247
MODE 2:	107.5	3.237
MODE 3:	215.0	2.237
D_{10}:	98.55	-0.856
MEDIAN or D_{50}:	372.2	1.426
D_{90}:	1809.9	3.343
(D_{90} / D_{10}):	18.37	-3.906
$(D_{90} - D_{10})$:	1711.4	4.199
(D_{75} / D_{25}):	4.008	2.986
$(D_{75} - D_{25})$:	373.0	2.003

GRAIN SIZE DISTRIBUTION			
GRAVEL:	7.1%	COARSE SAND:	7.1%
SAND:	88.8%	MEDIUM SAND:	29.6%
MUD:	4.1%	FINE SAND:	20.4%
		V FINE SAND:	21.4%
V COARSE GRAVEL:	1.0%	V COARSE SILT:	0.7%
COARSE GRAVEL:	1.0%	COARSE SILT:	0.7%
MEDIUM GRAVEL:	0.0%	MEDIUM SILT:	0.7%
FINE GRAVEL:	2.0%	FINE SILT:	0.7%
V FINE GRAVEL:	3.1%	V FINE SILT:	0.7%
V COARSE SAND:	10.2%	CLAY:	0.7%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	947.1	309.8	1.589	389.3	1.361	Medium Sand
SORTING (σ):	2867.9	4.290	1.932	3.349	1.744	Poorly Sorted
SKEWNESS (Sk):	7.788	-0.568	0.080	0.143	-0.143	Coarse Skewed
KURTOSIS (K):	69.33	5.891	4.806	1.084	1.084	Mesokurtic

GRAIN SIZE DISTRIBUTION



Sand Branch

SAMPLE STATISTICS

SAMPLE IDENTITY: **Sand Branch** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Poorly Sorted TEXTURAL GROUP: Muddy Sand

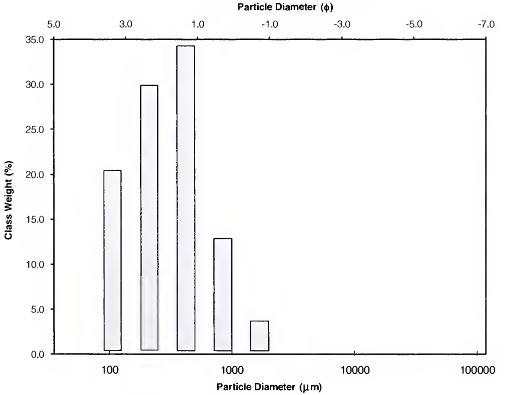
SEDIMENT NAME: Very Coarse Silty Medium Sand

	μm	φ
MODE 1:	427.5	1.247
MODE 2:	215.0	2.237
MODE 3:	107.5	3.237
D_{10}:	28.47	0.314
MEDIAN or D_{50}:	231.0	2.114
D_{90}:	804.2	5.135
(D_{90} / D_{10}):	28.25	16.33
$(D_{90} - D_{10})$:	775.7	4.820
(D_{75} / D_{25}):	3.962	2.681
$(D_{75} - D_{25})$:	329.7	1.986

GRAIN SIZE DISTRIBUTION			
GRAVEL:	0.0%	COARSE SAND:	11.0%
SAND:	86.0%	MEDIUM SAND:	30.0%
MUD:	14.0%	FINE SAND:	25.0%
		V FINE SAND:	17.0%
V COARSE GRAVEL:	0.0%	V COARSE SILT:	2.3%
COARSE GRAVEL:	0.0%	COARSE SILT:	2.3%
MEDIUM GRAVEL:	0.0%	MEDIUM SILT:	2.3%
FINE GRAVEL:	0.0%	FINE SILT:	2.3%
V FINE GRAVEL:	0.0%	V FINE SILT:	2.3%
V COARSE SAND:	3.0%	CLAY:	2.3%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	349.8	180.8	2.468	219.4	2.188	Fine Sand
SORTING (σ):	336.5	4.196	2.069	2.985	1.578	Poorly Sorted
SKEWNESS (Sk):	2.116	-1.165	1.165	-0.234	0.234	Fine Skewed
KURTOSIS (K):	8.498	3.566	3.566	1.337	1.337	Leptokurtic

GRAIN SIZE DISTRIBUTION



Shell

SAMPLE STATISTICS

SAMPLE IDENTITY: **Shell** ANALYST & DATE: ,

SAMPLE TYPE: Trimodal, Very Poorly Sorted TEXTURAL GROUP: Gravelly Muddy Sand

SEDIMENT NAME: Very Fine Gravelly Coarse Silty Medium Sand

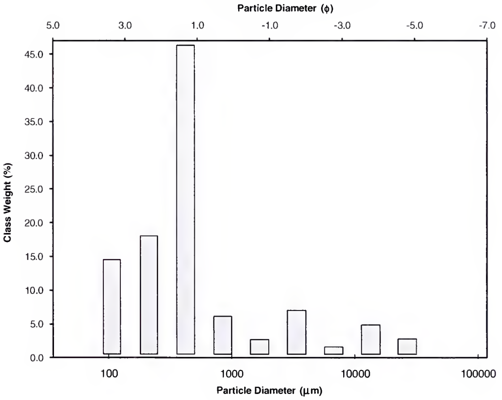
	μm	φ
MODE 1:	427.5	1.247
MODE 2:	215.0	2.237
MODE 3:	107.5	3.237
D_{10}:	39.63	-1.743
MEDIAN or D_{50}:	389.2	1.362
D_{90}:	3346.6	4.657
(D_{90} / D_{10}):	84.44	-2.672
$(D_{90} - D_{10})$:	3307.0	6.400
(D_{75} / D_{25}):	2.606	2.304
$(D_{75} - D_{25})$:	295.6	1.382

GRAIN SIZE DISTRIBUTION

GRAVEL:	13.0%	COARSE SAND:	5.0%
SAND:	75.0%	MEDIUM SAND:	41.0%
MUD:	12.0%	FINE SAND:	15.0%
		V FINE SAND:	12.0%
V COARSE GRAVEL:	0.0%	V COARSE SILT:	2.0%
COARSE GRAVEL:	2.0%	COARSE SILT:	2.0%
MEDIUM GRAVEL:	4.0%	MEDIUM SILT:	2.0%
FINE GRAVEL:	1.0%	FINE SILT:	2.0%
V FINE GRAVEL:	6.0%	V FINE SILT:	2.0%
V COARSE SAND:	2.0%	CLAY:	2.0%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	1656.0	308.7	1.696	331.7	1.592	Medium Sand
SORTING (σ):	4529.4	6.193	2.631	4.961	2.311	Very Poorly Sorted
SKEWNESS (Sk):	4.211	-0.153	0.153	-0.107	0.107	Fine Skewed
KURTOSIS (K):	21.41	3.709	3.709	2.948	2.948	Very Leptokurtic

GRAIN SIZE DISTRIBUTION



Tiger

SAMPLE STATISTICS

SAMPLE IDENTITY: **Tiger** ANALYST & DATE: ,

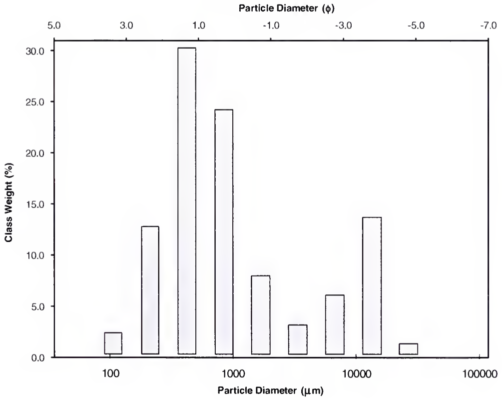
SAMPLE TYPE: Polymodal, Very Poorly Sorted TEXTURAL GROUP: Gravelly Sand

SEDIMENT NAME: Medium Gravelly Medium Sand

	μm	φ	GRAIN SIZE DISTRIBUTION			
MODE 1:	427.5	1.247	GRAVEL:	23.8%	COARSE SAND:	23.8%
MODE 2:	855.0	0.247	SAND:	75.2%	MEDIUM SAND:	29.7%
MODE 3:	215.0	2.237	MUD:	1.0%	FINE SAND:	11.9%
D_{10}:	218.6	-3.666			V FINE SAND:	2.0%
MEDIAN or D_{50}:	768.0	0.381	V COARSE GRAVEL:	0.0%	V COARSE SILT:	0.2%
D_{90}:	12689.2	2.194	COARSE GRAVEL:	1.0%	COARSE SILT:	0.2%
(D_{90} / D_{10}):	58.04	-0.598	MEDIUM GRAVEL:	13.9%	MEDIUM SILT:	0.2%
$(D_{90} - D_{10})$:	12470.6	5.859	FINE GRAVEL:	5.9%	FINE SILT:	0.2%
(D_{75} / D_{25}):	4.740	-1.441	V FINE GRAVEL:	3.0%	V FINE SILT:	0.2%
$(D_{75} - D_{25})$:	1492.5	2.245	V COARSE SAND:	7.9%	CLAY:	0.2%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	3149.7	1007.6	-0.011	1273.0	-0.348	Very Coarse Sand
SORTING (σ):	5144.1	4.356	2.123	4.112	2.040	Very Poorly Sorted
SKEWNESS (Sk):	2.069	0.378	-0.378	0.428	-0.428	Very Coarse Skewed
KURTOSIS (K):	6.963	3.211	3.211	1.140	1.140	Leptokurtic

GRAIN SIZE DISTRIBUTION



Trib to Ochillee

SAMPLE STATISTICS

SAMPLE IDENTITY: **Trib to Ochillee** ANALYST & DATE: ,

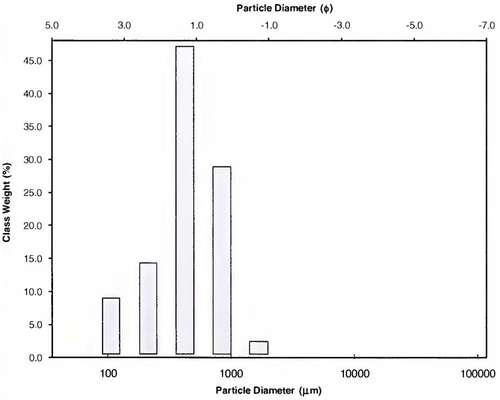
SAMPLE TYPE: Polymodal, Poorly Sorted TEXTURAL GROUP: Sand

SEDIMENT NAME: Poorly Sorted Medium Sand

	μm	φ	GRAIN SIZE DISTRIBUTION			
MODE 1:	427.5	1.247	GRAVEL:	0.0%	COARSE SAND:	28.0%
MODE 2:	855.0	0.247	SAND:	97.0%	MEDIUM SAND:	46.0%
MODE 3:	215.0	2.237	MUD:	3.0%	FINE SAND:	13.0%
D_{10}:	120.0	0.141			V FINE SAND:	8.0%
MEDIAN or D_{50}:	430.8	1.215	V COARSE GRAVEL:	0.0%	V COARSE SILT:	0.5%
D_{90}:	906.8	3.059	COARSE GRAVEL:	0.0%	COARSE SILT:	0.5%
(D_{90} / D_{10}):	7.558	21.67	MEDIUM GRAVEL:	0.0%	MEDIUM SILT:	0.5%
$(D_{90} - D_{10})$:	786.8	2.918	FINE GRAVEL:	0.0%	FINE SILT:	0.5%
(D_{75} / D_{25}):	2.110	3.655	V FINE GRAVEL:	0.0%	V FINE SILT:	0.5%
$(D_{75} - D_{25})$:	397.1	1.077	V COARSE SAND:	2.0%	CLAY:	0.5%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	507.6	382.2	1.388	420.1	1.251	Medium Sand
SORTING (σ):	309.7	2.518	1.332	2.016	1.012	Poorly Sorted
SKEWNESS (Sk):	1.139	-2.226	2.226	-0.175	0.175	Fine Skewed
KURTOSIS (K):	5.335	10.01	10.01	1.256	1.256	Leptokurtic

GRAIN SIZE DISTRIBUTION



Trib to Upatoi

SAMPLE STATISTICS

SAMPLE IDENTITY: **Trib to Upatoi** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Poorly Sorted TEXTURAL GROUP: Gravelly Sand

SEDIMENT NAME: Fine Gravelly Medium Sand

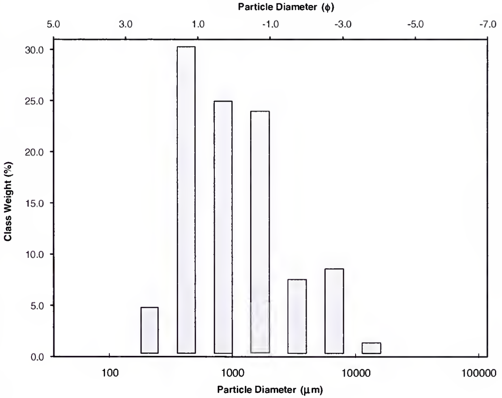
	μm	φ
MODE 1:	427.5	1.247
MODE 2:	855.0	0.247
MODE 3:	1700.0	-0.743
D_{10}:	358.9	-1.934
MEDIAN or D_{50}:	855.3	0.226
D_{90}:	3820.7	1.478
(D_{90} / D_{10}):	10.64	-0.764
$(D_{90} - D_{10})$:	3461.8	3.412
(D_{75} / D_{25}):	4.057	-1.512
$(D_{75} - D_{25})$:	1315.8	2.020

GRAIN SIZE DISTRIBUTION

GRAVEL:	16.2%	COARSE SAND:	23.2%
SAND:	78.8%	MEDIUM SAND:	28.3%
MUD:	5.0%	FINE SAND:	4.0%
		V FINE SAND:	0.0%
V COARSE GRAVEL:	0.0%	V COARSE SILT:	0.8%
COARSE GRAVEL:	0.0%	COARSE SILT:	0.8%
MEDIUM GRAVEL:	1.0%	MEDIUM SILT:	0.8%
FINE GRAVEL:	8.1%	FINE SILT:	0.8%
V FINE GRAVEL:	7.1%	V FINE SILT:	0.8%
V COARSE SAND:	23.2%	CLAY:	0.8%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	1652.1	813.1	0.299	976.8	0.034	Coarse Sand
SORTING (σ):	2141.9	4.090	2.032	3.350	1.744	Poorly Sorted
SKEWNESS (Sk):	2.815	-1.417	1.417	0.039	-0.039	Symmetrical
KURTOSIS (K):	12.57	6.649	6.649	1.374	1.374	Leptokurtic

GRAIN SIZE DISTRIBUTION



Wolf

SAMPLE STATISTICS

SAMPLE IDENTITY: **Wolf** ANALYST & DATE: ,

SAMPLE TYPE: Polymodal, Very Poorly Sorted TEXTURAL GROUP: Sandy Gravel

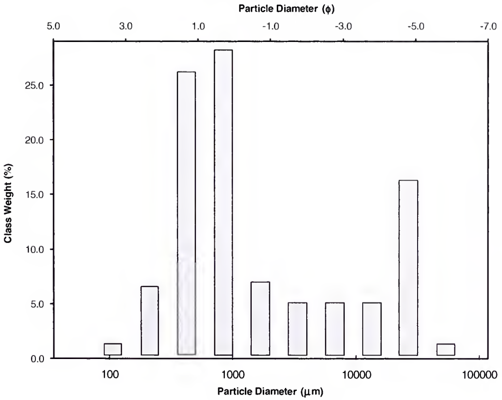
SEDIMENT NAME: Sandy Coarse Gravel

	μm	φ
MODE 1:	855.0	0.247
MODE 2:	427.5	1.247
MODE 3:	1700.0	-0.743
D_{10}:	369.3	-4.701
MEDIAN or D_{50}:	874.1	0.194
D_{90}:	26003.1	1.437
(D_{90} / D_{10}):	70.41	-0.306
$(D_{90} - D_{10})$:	25633.8	6.138
(D_{75} / D_{25}):	14.35	-0.428
$(D_{75} - D_{25})$:	6008.8	3.843

GRAIN SIZE DISTRIBUTION			
GRAVEL:	32.0%	COARSE SAND:	28.0%
SAND:	68.0%	MEDIUM SAND:	26.0%
MUD:	0.0%	FINE SAND:	6.0%
		V FINE SAND:	1.0%
V COARSE GRAVEL:	1.0%	V COARSE SILT:	0.0%
COARSE GRAVEL:	16.0%	COARSE SILT:	0.0%
MEDIUM GRAVEL:	5.0%	MEDIUM SILT:	0.0%
FINE GRAVEL:	5.0%	FINE SILT:	0.0%
V FINE GRAVEL:	5.0%	V FINE SILT:	0.0%
V COARSE SAND:	7.0%	CLAY:	0.0%

	METHOD OF MOMENTS			FOLK & WARD METHOD		
	Arithmetic μm	Geometric μm	Logarithmic φ	Geometric μm	Logarithmic φ	Description
MEAN ($\bar{x}$):	6525.5	1644.6	-0.718	1999.5	-1.000	Very Coarse Sand
SORTING (σ):	10741.6	5.073	2.343	5.745	2.522	Very Poorly Sorted
SKEWNESS (Sk):	1.867	0.705	-0.705	0.527	-0.527	Very Coarse Skewed
KURTOSIS (K):	5.977	2.127	2.127	0.748	0.748	Platykurtic

GRAIN SIZE DISTRIBUTION



APPENDIX D - Land Use Data

Land Use by Watershed

Watershed	Bare Ground or Impervious (Acres)	Forest (Acres)	Shrub / Grass (Acres)	Water (Acres)	Total Acreage	Bare Ground or Impervious (Percent)	Forest (Percent)	Shrub / Grass (Percent)	Water (Percent)
Bonham	192.3	1231.3	764.8	10.1	2198.5	8.7%	56.0%	34.8%	0.5%
Halloca	120.9	1531.5	880.4	0.0	2532.8	4.8%	60.5%	34.8%	0.0%
Hewell	139.4	1650.6	1082.3	0.0	2872.4	4.9%	57.5%	37.7%	0.0%
Hollis Branch	94.5	910.9	559.9	9.5	1574.8	6.0%	57.8%	35.6%	0.6%
Hollis Creek	425.0	2543.4	1563.6	33.7	4565.7	9.3%	55.7%	34.2%	0.7%
Little Pine Knot	121.7	791.1	408.0	0.0	1320.8	9.2%	59.9%	30.9%	0.0%
Long Branch	122.7	860.1	295.5	0.0	1278.2	9.6%	67.3%	23.1%	0.0%
Orphan	116.8	276.0	555.3	0.0	948.1	12.3%	29.1%	58.6%	0.0%
Oswichee	48.8	1182.6	531.7	2.3	1765.4	2.8%	67.0%	30.1%	0.1%
Sally Branch	216.3	2392.6	1438.8	0.0	4047.8	5.3%	59.1%	35.5%	0.1%
Sand	196.1	837.1	1291.3	5.8	2330.2	8.4%	35.9%	55.4%	0.2%
Shell	131.4	1131.4	949.2	0.8	2212.8	5.9%	51.1%	42.9%	0.0%
Tiger	848.4	1494.0	862.4	24.9	3229.7	26.3%	46.3%	26.7%	0.8%
Trib to Ochillee	59.7	877.6	469.9	2.2	1409.4	4.2%	62.3%	33.3%	0.2%
Trib to Upatoi	30.7	506.1	258.0	0.0	794.8	3.9%	63.7%	32.5%	0.0%
Wolf	592.1	3375.5	2113.6	8.8	6090.0	9.7%	55.4%	34.7%	0.1%

APPENDIX E - Soil Series Area by Watershed

	Watershed															
	Bonham		Halloca		Hewell		Hollis Branch		Hollis Creek		Little Pina Knot		Long Branch		Orphan	
Soil Symbol	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area
AaB	0.16	0.01%	37.13	1.47%	4.30	0.15%			7.35	0.16%	15.96	1.21%	17.75	1.39%	12.28	1.30%
AaC	1.42	0.06%	104.19	4.11%	10.52	0.37%			60.87	1.33%	80.60	6.10%	53.20	4.16%	23.25	2.45%
Bh	176.31	8.02%	238.23	9.40%	75.58	2.63%	185.45	11.77%	315.03	6.90%	96.22	7.28%	178.05	13.93%	76.77	8.10%
Ch					13.61	0.47%			15.28	0.33%	8.06	0.61%				
COC	45.06	2.05%	46.38	1.83%	50.73	1.77%			38.64	0.85%					40.82	4.31%
COD	266.14	12.10%	107.59	4.25%	59.70	2.08%	127.35	8.09%	206.16	4.52%	142.05	10.75%				
COE							0.11	0.01%	49.34	1.08%					49.75	5.25%
CWE	162.21	7.38%	84.99	3.35%	58.02	2.02%	526.61	33.43%	795.39	17.42%	390.78	29.58%				
DoB	5.94	0.27%			1.40	0.05%									2.71	0.29%
DoC	0.78	0.04%			0.29	0.01%			1.96	0.04%					3.57	0.38%
DuB																
EmB	4.69	0.21%														
EmC			32.71	1.29%												
EmD																
EnE																
EOD													0.83	0.06%		
EPE																
EtA																
EuA																
FuB					15.01	0.52%			3.98	0.09%						
FuC	19.35	0.88%			0.75	0.03%										
Iu									3.71	0.08%						
LaB			56.56	2.23%	8.03	0.28%	21.67	1.38%	147.39	3.23%	6.49	0.49%				
LaC	24.13	1.10%	22.92	0.90%	17.70	0.62%	59.60	3.78%	482.21	10.56%						
LaD	6.36	0.29%					5.15	0.33%	385.73	8.45%	6.73	0.51%				
LaE																
LkE									7.52	0.16%						
LuB					50.60	1.76%	52.07	3.31%	54.02	1.18%	9.75	0.74%				
LuC	0.68	0.03%			22.87	0.80%	30.32	1.92%	38.54	0.84%	38.43	2.91%				
NaB	14.29	0.65%	25.56	1.01%	10.16	0.35%		0.00%	89.87	1.97%	7.30	0.55%			8.06	0.85%
NaC	236.21	10.74%	137.94	5.44%	120.36	4.19%	48.65	3.09%	284.59	6.23%	21.30	1.61%			41.67	4.39%
NkC3	37.37	1.70%	235.47	9.29%	156.90	5.46%										
NkD3	163.62	7.44%	369.56	14.59%	539.50	18.78%			62.57	1.37%					20.82	2.20%
NkE3	0.37	0.02%			39.23	1.37%			144.00	3.15%	0.00	0.00%			246.42	25.99%
NnE3	133.00	6.05%	717.23	28.31%	637.84	22.20%	0.25	0.02%	119.97	2.63%					66.71	7.04%
NnF3					29.57	1.03%	28.64	1.82%								

	Watershed															
	Bonham		Halloca		Hewell		Hollis Branch		Hollis Creek		Little Pine Knot		Long Branch		Orphan	
Soil Symbol	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area
Oc	5 30	0 24%	50 49	1 99%	182 19	6 34%			59 28	1 30%						
OrB							52 20	3 31%	101 00	2 21%	40 41	3 06%				
OrC							80 90	5 14%	82 86	1 81%			25 34	1 98%		
OrD2							19 81	1 26%	21 02	0 46%						
OuC																
Pm																
Ps			3 28	0 13%					3 77	0 08%						
SeA													112 61	8 81%		
SuC																
To																
TrB	228 98	10 41%	37 30	1 47%	205 99	7 17%	26 46	1 68%	93 23	2 04%	165 67	12 54%	9 82	0 77%	78 57	8 29%
TrC	535 02	24 33%	148 56	5 86%	356 33	12 40%	140 69	8 93%	472 86	10 36%	215 01	16 27%			251 84	26 56%
TrD	107 66	4 90%	56 83	2 24%	145 76	5 07%	101 86	6 47%	92 36	2 02%	28 07	2 12%			3 76	0 40%
TrE															21 07	2 22%
TSD																
TuE	12 41	0 56%	19 27	0 76%	55 90	1 95%	63 21	4 01%	305 87	6 70%	48 36	3 66%				
TVD													502 94	39 34%		
Ua	1 90	0 09%			4 26	0 15%	4 15	0 26%					17 38	1 36%		
VeC													105 35	8 24%		
VeD																
W	9 77	0 44%	1 35	0 05%					19 77	0 43%						
WaB													28 74	2 25%		
WaC													226 57	17 72%		
WbA																
WhA																
Grand Total	**2199 14**	**100 00 %**	**2533 56**	**100 00 %**	**2873 13**	**100 00 %**	**1575.13**	**100 00 %**	**4566 14**	**100 00 %**	**1321 18**	**100 00 %**	**1278 57**	**100 00 %**	**948 07**	**100 00 %**

Soil Symbol	Watershed															
	Oswichee		Sally Branch		Sand Branch		Shell		Tiger		Trib to Ochillee		Trib to Upatoi		Wolf	
	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area
AaB			43.06	1.06%							2.12	0.15%	0.04	0.00%	23.97	0.39%
AaC			103.57	2.56%	12.65	0.54%			58.89	1.82%	46.51	3.30%	112.27	14.12%	489.49	8.04%
Bh	59.09	3.35%	489.18	12.08%					350.43	10.85%	2.73	0.19%			803.73	13.20%
Ch	28.58	1.62%					117.26	5.30%								
COC	69.62	3.94%	123.79	3.06%	19.71	0.85%					35.36	2.51%				
COD	15.82	0.90%	58.99	1.46%							193.02	13.69%				
COE					0.78	0.03%										
CWE	28.34	1.60%	119.42	2.95%	14.38	0.62%					184.98	13.12%				
DoB									49.45	1.53%						
DoC									79.62	2.46%					0.65	0.01%
DuB									476.32	14.74%						
EmB					9.47	0.41%	15.69	0.71%	91.40	2.83%						
EmC	4.40	0.25%					9.92	0.45%								
EmD					37.79	1.62%										
EnE									157.99	4.89%						
EOD									244.84	7.58%					292.75	4.81%
EPE									142.15	4.40%					95.69	1.57%
EtA	8.77	0.50%							43.54	1.35%					220.54	3.62%
EuA									96.94	3.00%						
FuB	1.54	0.09%									1.10	0.08%				
FuC	4.43	0.25%														
Iu					154.05	6.61%										
LaB			223.35	5.52%	3.14	0.13%					0.12	0.01%				
LaC			113.71	2.81%					1.44	0.04%	1.04	0.07%			6.62	0.11%
LaD			62.50	1.54%												
LaE									60.61	1.88%					30.41	0.50%
LkE																
LuB	17.88	1.01%									2.39	0.17%				
LuC					7.35	0.32%										
NaB	9.53	0.54%	127.17	3.14%	60.77	2.61%	12.01	0.54%								
NaC	48.24	2.73%	333.41	8.23%	472.67	20.28%					104.77	7.43%				
NkC3	321.00	18.18%	299.23	7.39%	190.55	8.18%	872.38	39.41%			63.03	4.47%				
NkD3	501.87	28.42%	298.20	7.37%	135.93	5.83%	257.15	11.62%			55.89	3.96%				
NkE3					525.92	22.57%										
NnE3	409.73	23.20%	1115.67	27.56%	304.39	13.06%	656.59	29.66%			23.33	1.65%				
NnF3	5.23	0.30%			33.71	1.45%	270.13	12.20%								

	Watershed															
	Oswichee		Sally Branch		Sand Branch		Shell		Tiger		Trib to Ochillee		Trib to Upatoi		Wolf	
Soil Symbol	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area	Area (Acres)	% of Area
Oc	41.21	2.33%	28.08	0.69%	46.89	2.01%	0.70	0.03%			106.43	7.55%				
OrB									23.14	0.72%					13.74	0.23%
OrC									87.38	2.70%						
OrD2																
OuC									45.45	1.41%					0.01	0.00%
Pm									39.18	1.21%			123.41	15.52%	62.09	1.02%
Ps																
SeA									18.50	0.57%					351.10	5.76%
SuC															0.47	0.01%
To									47.85	1.48%					7.59	0.12%
TrB	111.97	6.34%	69.78	1.72%	41.30	1.77%					45.36	3.22%	5.45	0.69%	6.10	0.10%
TrC	43.89	2.49%	303.32	7.49%	247.61	10.62%	1.20	0.05%	148.46	4.60%	403.66	28.63%	55.81	7.02%	275.53	4.52%
TrD	21.56	1.22%	23.82	0.59%	3.89	0.17%			210.84	6.53%	103.13	7.31%			74.19	1.22%
TrE	2.59	0.15%														
TSD									184.70	5.72%					39.99	0.66%
TuE			112.48	2.78%							32.47	2.30%				
TVD									45.44	1.41%			362.52	45.58%	1731.25	28.42%
Ua	8.42	0.48%			2.35	0.10%	0.48	0.02%	106.34	3.29%			0.33	0.04%	40.48	0.66%
VeC									192.36	5.95%			60.09	7.56%	602.26	9.89%
VeD									188.76	5.84%					131.50	2.16%
W	2.17	0.12%			5.33	0.23%			25.65	0.79%	2.45	0.17%			5.45	0.09%
WaB									6.24	0.19%			36.20	4.55%	198.18	3.25%
WaC									6.82	0.21%			39.19	4.93%	569.08	9.34%
WbA															5.02	0.08%
WhA															13.24	0.22%
Grand Total	**1765.88**	**100.00 %**	**4048.72**	**100.00 %**	**2330.65**	**100.00 %**	**2213.51**	**100.00 %**	**3230.76**	**100.00 %**	**1409.88**	**100.00 %**	**795.31**	**100.00 %**	**6091.11**	**100.00 %**

APPENDIX F - Soil Erodibility Index Values

Soil Erodibility Index, Percentage of Area by Watershed

% of Watershed	Soil Erodibility Index Value (CSRK) Annual Soil Loss (ton/acre year)																		
	0	0.05	0.08	0.09	0.14	0.16	0.24	0.24	0.32	0.33	0.49	0.56	0.65	0.89	1.27	1.62	2.35	12.05	20.72
Bonham	0.40%		58.99%			17.78%		6.50%	3.84%		4.32%		2.44%	2.04%		2.12%			1.58%
Halloca	0.04%		46.73%			17.85%		11.13%	4.60%		4.76%		4.20%	4.99%		3.75%			1.94%
Hewell	0.00%		36.70%			23.42%		12.58%	5.44%		7.27%		5.75%	4.37%		2.30%			2.17%
Hollis Branch	0.00%		47.38%			24.36%		7.89%	5.65%		6.64%		2.11%	1.36%		2.30%			2.31%
Hollis Creek	0.58%		58.26%			16.67%		8.26%	4.27%		3.47%		1.48%	1.49%		2.88%			2.62%
Little Pine Knot	0.00%		67.01%			13.92%		5.20%	3.60%		3.39%		1.11%	1.01%		2.60%			2.17%
Orphan	0.04%		28.14%			19.20%		12.36%	6.75%		8.90%		6.90%	6.89%		5.03%			5.79%
Oswichee	0.19%		25.16%			28.63%		18.35%	5.88%		7.12%		5.54%	5.26%		2.35%			1.50%
Sally Branch	0.04%		47.55%			17.67%		11.08%	5.03%		4.49%		3.37%	3.85%		4.26%			2.65%
Sand Branch	0.29%		20.40%			19.49%		13.58%	7.81%		11.82%		8.66%	7.51%		4.45%			6.00%
Shell	0.06%		29.29%			24.46%		9.46%	6.90%		10.49%		6.59%	4.78%		2.80%			5.18%
Trib to Ochillee	0.17%		62.48%			17.04%		7.62%	3.68%		3.47%		1.64%	1.58%		1.41%			0.91%
Long Branch	0.02%	39.83%		30.06%	7.32%		6.57%			4.04%		3.82%			2.91%		2.27%	3.18%	
Tiger	1.22%	23.45%		20.52%	10.05%		9.35%			4.89%		6.21%			8.37%		8.29%	7.66%	
Trib to Upatoi	0.02%	27.12%		34.57%	11.34%		10.91%			6.93%		5.22%			1.21%		1.41%	1.29%	
Wolf	0.25%	34.78%		24.36%	9.68%		10.64%			6.08%		5.22%			3.01%		3.06%	2.90%	

Soil Erodibility Index, Acreage by Watershed

Watershed Acreage	Soil Erodibility Index Value (CSRK) Annual Soil Loss (ton/acre year)																		
	0	**0.05**	**0.08**	**0.09**	**0.14**	**0.16**	**0.24**	**0.24**	**0.32**	**0.33**	**0.49**	**0.56**	**0.65**	**0.89**	**1.27**	**1.62**	**2.35**	**12.05**	**20.72**
Bonham	11.19		1669.13			503.16		183.87	108.55		122.25		68.91	57.63		60.08			44.71
Halloca	1.47		1588.25			606.67		378.36	156.42		161.92		142.81	169.76		127.44			65.79
Hewell	0.02		1068.78			682.16		366.41	158.31		211.66		167.45	127.25		66.90			63.19
Hollis Branch	0.00		814.00			418.56		135.57	97.02		114.00		36.19	23.31		39.58			39.67
Hollis Creek	35.32		3547.20			1015.18		503.21	260.09		211.27		90.22	90.89		175.57			159.60
Little Pine Knot	0.02		1247.03			259.00		96.81	66.93		63.17		20.58	18.75		48.35			40.31
Orphan	0.42		277.19			189.11		121.77	66.47		87.64		67.96	67.85		49.51			56.98
Oswichee	3.47		451.34			513.54		329.14	105.55		127.71		99.44	94.29		42.24			26.99
Sally Branch	1.80		2372.56			881.84		553.05	251.09		224.05		168.26	192.11		212.39			132.36
Sand Branch	7.13		499.73			477.33		332.52	191.19		289.57		212.05	184.01		108.88			147.06
Shell	1.25		653.95			545.98		211.19	153.98		234.07		147.16	106.67		62.53			115.64
Trib to Ochillee	3.04		1089.81			297.30		132.86	64.19		60.55		28.57	27.61		24.60			15.85
Long Branch	0.22	557.42		420.75	102.42		91.93			56.49		53.50			40.67		31.79	44.46	
Tiger	38.09	733.51		641.98	314.44		292.43			153.05		194.16			261.70		259.21	239.47	
Trib to Upatoi	0.12	214.94		274.01	89.91		86.48			54.90		41.36			9.57		11.14	10.25	
Wolf	15.64	2143.38		1501.08	596.79		655.87			374.64		321.74			185.31		188.86	178.95	